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USSR Report

SCIENCE AND TECHNOLOGY POLICY

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USSR REPORT

SCIENCE AND TECHNOLOGY POLICY

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Moscow IZVESTIYA in Russian 11 Oct 85 pp 1-2

[Interview with Vice President of the Ukrainian SSR Academy of Sciences Academician Ivan Illarionovich Lukinov, director of the Institute of Economics of the Ukrainian SSR Academy of Sciences, by IZVESTIYA correspondent S. Tsikora under the rubric "Time. Economics. Man" (Kiev): "The Force of Interest"; date not given; first three paragraphs are IZVESTIYA introduction]

[Text] Today we imagine quite clearly what it is necessary to do for the acceleration of the socioeconomic development of our country. The April (1985) CPSU Central Committee Plenum and the conferences in the CPSU Central Committee, which followed it, provided an answer to many questions. The key to success lies in the acceleration of scientific and technical progress and in the technological retooling of the national economy. It is now a matter of how, and besides more quickly, to implement all this.

The analysis of the gained experience and the results of the experiments and the comprehension of the complex processes of the scientific and technical revolution are making it possible to imagine more and more distinctly what the mechanism, which is capable of accelerating the technological retooling of all the sectors of our economy, should be like.

The conversation of our correspondent with Vice President of the Ukrainian Academy of Sciences Academician Ivan Illarionovich Lukinov, director of the Institute of Economics of the Ukrainian SSR Academy of Sciences, is also about this.

[Answer] "The development of such a mechanism is, of course, a complex problem which requires a comprehensive approach," I. Lukinov said. "The mass and rapid commitment to the economic turnover of the fundamentally new scientific discoveries and scientific, technical, and technological developments, which revolutionary changes are introducing in production and which make it possible to achieve the highest world level of labor productivity, involves a thorough structural reorientation and the introduction of a new investment, pricing, financial, and credit policy and more advanced methods of planned economic management.

"The search in this direction in recent years has been conducted very actively. An extensive experimental check of the provisions of the new economic mechanism is being conducted in accordance with a decision of the CPSU Central Committee and the USSR Council of Ministers. They are reflected in the scientific concept of the strategic course of the socioeconomic policy of the party. The condition, under which these problems would be solved more easily and more rapidly, is also well known. This is the involvement of all labor collectives and workers in the process of the scientific and technical retooling of production. And not in the role of simple performers, but as vitally interested socialist managers who are striving to accomplish quickly the required technological changes at their enterprise, in their shop and brigade, at their work place. And not only interested, but also responsible without fail for their section of the work. Interested and responsible first of all economically, which in the language of practice signifies material and moral compensation, which corresponds strictly to the results, for good, high-quality work. And punishment by the ruble for careless labor. This conforms exactly to Lenin's principle of socialist cost accounting."

[Question] "From the point of view of theory here, obviously, everything is correct. But life presents many examples, when the earned assets, including for bringing up the lagging collectives, are withheld from leading enterprises. About what interest of collectives in good work can one speak given such methods of management?!"

[Answer] "What you are saying once again confirms the unacceptability of such methods of management. Unfortunately, leveling, which is at variance with the socialist principles of management, places not only individual enterprises, but also entire sectors of production in a difficult situation. An example of this is the economic situation, in which, for example, in our republic the food and coal industries found themselves. Prior to the changeover to the conditions of the economic experiment nearly the entire profit was withheld from the food industry workers with their such highly profitable sectors as the production of sugar, vegetable oil, and grain products. They have fallen into debt. While the coal industry workers, being among the sectors which are planned to operate at a loss, seem not to have particular debts, since they annually receive outright from the state large subsidies. We can also observe this phenomenon on even larger scales with respect to groups of highly profitable and unprofitable enterprises.

"Not one and not two sectors are in similar situations. Why, what is behind this: the negligence of economists or the imperfection of the methods of management?

"That is just the point, it is neither one nor the other. The amassing of accumulations, which have been obtained in the national economy, for their purposeful use in the solution of key problems of national importance is a proven method of our economy, if you wish, the greatest advantage of socialism. For many years it enabled the country both to keep the powder dry and to increase the standard of living of the population. Our state, undoubtedly, will also use this tried method in the future, but, apparently, with one essential modification.

"Budget financing, in my opinion, should be used only at projects which predetermine global national economic changes and rapid progress. For example, such ones as the laying of new transportation routes, the development of large irrigation systems, new sectors and complexes, the development of space and the world ocean for the peaceful needs of mankind, the search for and use of new deposits of petroleum, gas, ores. But here, too, for the cardinal increase of the efficiency of the resources, which are allocated centrally by the state, strict economic liability for their use, on the basis of socialist cost accounting principles, should be introduced.

"As for operating works and enterprises, they, as M.S. Gorbachev said about this, should live on the assets earned by the labor of their collectives. By means of these assets they should carry out renovation, construct housing and health-improvement and mass cultural complexes, pay bonuses to the best workers. This is also a real cost accounting principle in action. In a certain sense it conflicts with the method of nonreturnable financing. The latter creates for the enterprise hothouse conditions of sorts, since it presents both finances and their material backing 'on a little plate with a little blue border' and it is not obvious at whose expense.

"Therefore, the display of particular interest of several managers in the active 'knocking out' of understated plans and overstated resources on a free basis is also not by chance. Cost accounting places all things in their place and develops healthy economic initiative. The mechanism of its effect is aimed at the stimulation of interests and the concentration of the creative and labor efforts of all members of the collective and society on the continuous improvement of the economy for the meeting of the changing requirements of the consumer and on the increase of the accumulations of enterprises and the state budget. And this induces them to work more rapidly and with better quality and to strive for the acceleration of the pace of scientific and technical progress and the strengthening of the economic might of the state."

[Question] "Do you believe that cost accounting is also the very lever which will enable us to fling wide open the doors for scientific and technical progress in the national economy?"

[Answer] "No. Such an understanding would be one-sided and incorrect. Much else is needed for this. And first of all the strengthening of the principle of democratic centralism and all planned management and the creation of stable economic conditions for the work of enterprises on the basis of full cost accounting. This is achievable only in case of the optimization of price and nonprice levers of economic management: their fundamental connection with the plan, the growth rate, and structural changes both for the national economy as a whole and at specific associations and enterprises, as well as with the inevitably occurring changes of the demand of consumers. The real bound of the ability to maintain constantly a balance of the resources, which are changing quantitatively and qualitatively, on the one hand, and, on the other, the demand of consumers lies precisely here. The plan and the price regulator in this matter play a decisive role.

"So that enterprises and sectors could, informally but actually change over to cost accounting, about which we are speaking, it will be necessary to make serious adjustments both in the mechanism of pricing and in the levels of the established prices. This step is most responsible, but it is necessary to make up one's mind to take it, since without this it is hardly possible to speak in earnest about the elimination of the different profitability of production--to break down products and services into profitable ones, ones with a low profit, and unprofitable ones.

"It should be said that immense work has already been done here. But not to the end. Moreover, it is necessary to make in earnest the cornerstone of economic management the problem of the decrease of the product cost and the increase of the output-capital ratio and the transformation of scientific and technical progress into a price-reducing factor. Only in this way will it be possible to remove from the agenda the most difficult problem of the economically unjustified different profitability of the assortment and the artificial breakdown of enterprises due to the imperfection of prices into leading and lagging ones.

"I will cite an example from the area of agricultural production. Many people probably remember how often in the past 2 decades the purchase prices for agricultural products were changed. This was done not because the conditions worsened and their production decreased. On the contrary, they began to produce significantly more. But the purchase prices for agricultural products were rigidly controlled, while the prices for agricultural machinery, fertilizers, fuel, construction materials, and services were controlled not that strictly. And the wholesale prices for them began to creep upward, while after them the production cost of agricultural products also began to increase, and the profitability began to decline. Sometimes it turned out that the people in the field worked to their utmost, while the profitability of the farm did not exceed the mark of 1-2 percent. About what real cost accounting is it possible to speak given such a situation?! A portion of the kolkhozes and sovkhozes in general got onto the list of unprofitable ones.

"In order to strengthen the economy of the agrarian sector, it was necessary to increase the purchase prices for many products and to introduce markups on them for unprofitable farms or farms with a low profitability. The profitability of the majority of them increased substantially, but until now the proper balance in the movement of wholesale and purchase prices is lacking, and the production cost of products increases at times regardless of the level of the work of one labor collective or another.

"What is the way out? It appears to me in the form of the effective maintenance of the planned balance of prices for the products of related sectors. For the agroindustrial complex we developed, for example, a method of the precise identification of forming unbalances and the determination of the optimum price ratio in case of the exchange of industrial and agricultural products, which does not disturb the level of the cost accounting profitability of production. Obviously, these comparatively simple calculations should be made annually and the corresponding adjustments should be made in the ratios of the wholesale and purchase prices, without taking the

matter to extremes, which turn into a hinderance of economic growth and require very painful one-time reforms."

[Question] "Let us assume, Ivan Illarionovich, that the first condition for the implementation of genuine cost accounting has been fulfilled: the price level and parity between the sectors of the national economy are observed. What will force the labor collective to turn to face the latest technologies and to be interested in the increase of the output first of all of high-quality products?"

[Answer] "If I put it briefly, then it is the strictest observance of the stimulating cost accounting principles, the conditions of the production and marketing of products, the reimbursement of costs, the obtaining and distribution of revenues, remuneration precisely in accordance with the end results of the labor of each person without far-fetched restrictions. Precisely stable prices, which guarantee the enterprise a profitability for the planned rate of development and the qualitative updating of production, as well as the establishment of fixed long-term standards of the deductions for the budget (say, for a five-year plan) will enable the manager and the labor collective to know exactly what they have and to seek real means of the increase of the profitability. Their direct economic interest in cost accounting maneuverability and the search for means of the more efficient use of the resource potential appears. Here variants are possible: the assurance on the same resources of the additional output of products which enjoy the demand of the consumer, the updating of the assortment, the decrease of the production cost by means of the price-reducing interchange of resources, or everything taken together. Hence, too, the direct interest in the assimilation of resource-saving technologies, the more strict observance of technological discipline, and the increase of skills and the intensity of labor.

"If every labor collective is granted the right to actually dispose of by itself the obtained revenues, to solve within the limits of the unified national economic plan the problem, on the one hand, of their increase by means of economic maneuverability, technological and organizational updating and, on the other, of their most efficient expenditure--to properly stimulate people for better labor and to channel assets into where they yield the greatest return, it will not only sense itself to be the real manager, but will also become a specific bearer of responsibility. It will have to pay for the untimely delivery of products, their low quality, violations of the assortment and other economic contractual terms from the funds earned by its labor. Careless workers should inevitably and immediately bear strict economic and legal responsibility. If he worked poorly and provided defective output, there is no real source of remuneration. Everything becomes most clear and socially just to the greatest degree!"

[Question] "If the scientific conception of the reorganization of the economic mechanism has already been formulated, what is preventing its introduction?"

[Answer] "There are here both objective factors, for example, the still inadequate study of some provisions or others, the questionable nature of the

scientific idea, and the lack of study of the conclusions in an experiment, and subjective factors--the fears of making a mistake. It is always more comfortable to take the beaten path.

"A debate is under way, for example, between economists and financial experts concerning how to best dispose of the development fund. Many economists are inclined to the view that the enterprise be its complete manager. Financial experts are primarily for their withdrawal, giving as the reason for their argument the fact that it is possible to disperse assets and then there can be no question of the serious renovation and modernization of the enterprise. Their second argument concerns the difficulty for the enterprise of backing 'its own' development fund with goods. This is substantiated by the fact that at present we are experiencing a commercial shortage of machines, equipment, and construction materials even for the materialization of budget financing.

"In appearance it seems logical. Indeed, at present we are attaching the lion's share of the amount of materials available to budget financing. But who is preventing us from attaching these funds to the development funds of enterprises?! Then the question of 'dispersal' is also eliminated, and what is more in the unified investment plan!

"Or there is another situation. An enterprise has accumulated the assets for the retooling, for example, of a shop, but cannot find the necessary equipment. But hopeless situations, as is known, do not occur. There is the possibility of the use of the method of operations using its own resources, the production of the equipment in resourceful cooperation with other enterprises, and its prompt ordering on a basis which is mutually advantageous for the state and enterprises. And so on.

"The main thing is to arouse in people initiative and healthy socialist enterprise and to spur them to the generation of new ideas, quests and, solutions. They, ideas, are now just as necessary for the matter, on which the party has set to work, as are specific technologies. New ideas, scientific and applied developments, verified experience--these are the bread of today both for scientists and for practical workers."

[Question] "We have arrived little by little at a theme, about which they speak just as rarely in the press as about prices. It is a question of financial and credit regulation. In the economic mechanism of our economy behind this lever the force is no smaller than it is concealed in pricing. Only how is it to be applied a little more advantageously for the acceleration of scientific and technical progress?"

[Answer] "Having touched upon the mechanism of pricing, we cannot leave the financial and credit system untouched. They appear before us as two sides of the same medal. Changes here have been imminent for a long time, but now they have become simply necessary. And they should, in my opinion, occur earlier than cardinal technological changes in various sectors of the economy begin.

"Without financial support--this is clear to everyone--there can be no question of any acceleration of scientific and technical progress. But this implies a fundamental change in the activity of financial organs. Now they

will have to think not so much about where and from whom to withhold assets for the revenue of the budget as about a very difficult task--where it is a little more advantageous to channel them, in order in a comparatively short time to increase sharply the receipts of the budget precisely due to the faultlessness of investment strategy.

"In my opinion, the activity of the bank should also be changed radically. For the present it resembles more a teller, who issues money not in accordance with a list drawn up by him, than a financial expert who is actively participating in economic changes.

"The creation at enterprises of development funds which cannot be withheld and reliance on themselves during renovation will inevitably lead managers to the bank. Without bank credit you will not carry out large-scale changes. And here the role of the bank should increase to the role of a partner, for whom the equipment of a plant with the latest technology will be very profitable. But under such conditions it is difficult to count on the extension of credit for the purchase of equipment, which both does not increase labor productivity much and scarcely influences product quality. The bank will not issue money against such technical 'innovations,' since under the new conditions time for it will mean money, the extension of credit will mean a profit, and investment will mean efficiency. It is also necessary to revise the interest rate for long-term credit, which at present to a significant extent is of a symbolic, and not a stimulating nature. It is necessary to strengthen the prestige of the bank and to increase its role."

[Question] "A last question: In what way might everything, about which we spoke above, affect retail prices?"

[Answer] "The question is difficult. Under the conditions of the increase of the cost of production and the corresponding increase of wholesale and retail prices it is difficult for the state to pursue a policy of the stabilization and especially the decrease of retail prices. However, this policy is being firmly and consistently maintained. The index of state retail prices has even declined somewhat. But we should understand that this process is being implemented under the conditions of the simultaneous increase of budget subsidies. And they, as is known, are not very conducive to the development of cost accounting relations. Undoubtedly, the further revision of wholesale prices cannot but also affect the system of retail prices. But it is possible to carry out their change only in fundamental connection with the movement of the wage, the personal income of the workers, and the forming balances of supply and demand, in order to not allow a decrease and, on the contrary, to increase the real income. Methods of the comprehensive and balanced approach to the solution of these problems exist, it is important to use them skillfully."

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PROBLEMS FROM DESIGNING TO PRODUCTION OF NEW EQUIPMENT

Moscow PRAVDA in Russian 5 Sep 85 p 2

[Article by General Director of the Elektrosila Association B. Fomin, Hero of Socialist Labor (Leningrad): "The Laurels and Thorns"]

[Text] At the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress, of which I had occasion to be a participant, the scale of the posed tasks and the constructive suggestions on the most advisable means of their achievement created an enormous impression and made it incumbent to look in a new way, more demandingly, and more broadly at our collective work. It is necessary to reject more boldly the unsuitable forms of management, to change radically the very psychology of management, and to eliminate more resolutely the barriers in the way of the practical implementation of advanced ideas, including in case of the development of new equipment, which is efficient in the national economy and competitive on the international market. But there are many obstacles and thorns, as strange as this may seem, on its path from the design to introduction in the national economy, at times so many that the developers sometimes do not strive for the laurels, on which in the ideal they have the right to count.

Even the stereotype opinion that industrial enterprises, in avoiding unnecessary trouble and risk, do not wish to assimilate the output of new equipment and thereby are hindering scientific and technical progress, has formed. The assertion, let us say frankly, is not without certain grounds. But in essence it is impossible to agree with it. It is too oversimplified for the complex, at times contradictory set of economic, social, legal, and other conditions which determine the fate of new equipment.

Undoubtedly, the development and assimilation of a new product always involve additional expenditures of intellectual, manpower, and material resources and are accompanied by a certain, at times significant risk. But these costs are inevitable. It is entirely a matter of their amount.

I will cite the experience of our association. Its biography is in essence the history of the continuous development of new equipment: from the first 500-kilowatt turbogenerator to modern "millionaires" for nuclear electric

power plants, from the 7,500-kilowatt Volkhov hydraulic generators to the units of the Sayano-Shushenskaya GES with a rating of 640,000 kilowatts each.

Owing to the creative labor of researchers, designers, and workers from model to model not only is the unit power of electrical machines increasing, but the efficiency is also increasing, the functional possibilities are being broadened, the expenditures of materials, power, and labor during their production are decreasing. Now items of new equipment make up about a third in the volume of the production of output by the association. Among them are a 1 million-kilowatt high-speed turbogenerator, which will become the base model for atomic energy for the coming five-year plans, and machines of a unified standard series from 63,000 to 800,000 kilowatts. The economic impact from the use of new equipment with the Elektrosila mark came in 4 years to 101.8 million rubles, while by the end of the five-year plan it will increase by another 29.5 million rubles.

If we use the cited data, the illusion of complete well-being might be created. But nevertheless there are no grounds for complacency. And there should not be--for the advantages could give the country much more than now and could update equipment significantly more rapidly for the benefit of the national economic complex. So far, unfortunately, we are not taking into account such an economic category as the missed advantage. Its amount is great and most often is a consequence of inefficiency, the irresponsibility or incompetence of people and organizations, their inability, at times also reluctance to do the work as they should.

Let us take, for example, the following situation. The client ordered, while the producer developed a new item and began its production. And at that moment the client announces: the items are now not needed, they, perhaps, will be needed only a few years later. Managers know that such a situation is not hypothetical and in real life is not exceptional. It is a small loss if this concerns trifles. It is worse when the situation with large, expensive items changes. In particular, something like this happened at our association.

On the order of the USSR Ministry of Power and Electrification we developed turbogenerators of a unified standardized series with a rating of 320 and 500 megawatts. These are good modern machines with an increased efficiency and a longer service life. At the same time the material-output ratio of the generators was reduced by 20-25 percent. It seemed that such machines must be given, as they say, a green light. But when we had carried out all the technological preparation and had begun the production of the production prototype, the command--stop!--followed "from above." It turned out that the construction of the power-generating units, where in consultation with the Ministry of Power and Electrification it was planned to use our new generators, had been postponed to the 12th Five-Year Plan. The workers of the Elektrosila Association, of course, halted their production. No one, of course, is compensating us for the expenditures. But the most unpleasant thing is that the modern equipment is becoming obsolete.

It is paradoxical, but a fact that no one, except for the Elektrosila Association, suffered any loss! The client and the planning organs remained

aloof, while it would have probably been more logical and useful to ascertain in advance: Where was the miscalculation made and by whom? Who should be responsible and in what way for the freezing of considerable material and manpower resources?

When analyzing similar situations, most often you come to the conclusion that the root of evil and, consequently, the open channel, through which the same advantage which was missed for the state treasury escapes, are in the sphere of the planning of new equipment and, more precisely, in the imperfection of the methods of making decisions in the chain from forecasting to the issuing of specific assignments. A distinct system of the planning of new equipment simply does not exist in the area of power and large-scale electrical machine building. The ministry does not have a scientifically sound forecast of the development of the subsector for the coming 20-25 years, just as we also do not have so far a plan of the development of science and technology for the 12th Five-Year Plan. It is not necessary to be a specialist in order to understand that the lack of long-term plans of the designing, production, and deliveries of expensive, labor-consuming equipment with a long production cycle complicates the drafting and implementation of plans of the retooling of production and the work of research, design, technological, and supply services, and makes the contacts with suppliers of components unreliable.

At present the development and assimilation of new equipment are carried out in accordance with the five-year and annual plans, as well as the assignments of the comprehensive goal programs, which are approved by the USSR State Committee for Science and Technology, the USSR State Planning Committee, and the USSR Academy of Sciences. The quality of these programs frequently leaves much to be desired. As a rule, the assignments for the performers are formulated not specifically in them, there are discrepancies between the assignments of the program and the demands of the client. Frequently the client refuses completely or in part to receive the equipment in the agreed on amount, the delivery dates and the demands on the products are changed by strong-willed decisions. The uncertainty of the assignments, on the one hand, and the possibility without the knowledge of the producer of adjusting the schedules of output and the characteristics of items, on the other, interfere with the stable work of electric machine builders and disorganize production.

To a certain extent it is possible to avoid a large number of miscalculations, if the system of the development and production of new equipment is simplified. In what way? First of all it is necessary to adopt as a rule to submit all the assignments of the programs already at the stage of their formulation for the approval of the performers, having placed full material responsibility on the client for any changes which are made on his initiative in the plan of the production of new equipment. One should, it seems, also decrease drastically the number of indicators which now characterize the technical level of products. Many of them are insignificant or not urgent for the enterprise, while several are not of independent importance. It is quite realistic to manage with only two conditions: the assignment on the development and production of items, which are envisaged by the national economic plan and the scientific and technical programs, as well as the

indicator of the conformity to the assignment of the proportion of products of the highest quality category in the total commodity production.

Steps, which stimulate the acceleration of technical progress, have been taken in recent times. The economic experiment, in which the Elektrosila Association is also participating, not only is increasing the independence of the association and the responsibility for the end results, but is also contributing to the development of new highly efficient items. In accordance with the terms of the experiment the assignments on their assimilation and the technical level of products have been included among the most important planned indicators. The work of the collective is evaluated in accordance with them. Moral stimuli have been put to use, the possibilities of using material stimuli increased. The increase of the wage fund now depends on the economic impact of our products in the national economy. Due to the markups on the price of items of the highest quality, for example, the material incentive fund in 1 year increased by twofold.

This experiment is being supplemented fundamentally by another one--on the improvement of the organization and remuneration of the labor of designers and process engineers. The new procedure made it possible not only to decrease by 205 the number of engineers, but also to shorten by 1-2 months the time of designing. At the same time the basic contradictions, which are checking the development of design and technological operations, were also revealed more noticeably than before: routine operations take away too much time from specialists of creative labor. Of course, it is possible and necessary to mechanize and automate them. Much is being done in this direction, the impact is significant, but less than the anticipated and possible impact. Paper work, which does not lend itself to any automation, is increasing excessively. It is not enough to design the most advanced item. It is necessary to provide the design with tens of documents, which are many pages in length and which in reality no one needs. At the association they have calculated that just by the reasonable simplification of the regulations of the elaboration and especially the coordination of technical assignments and specifications, their delivery to the interdepartmental commission, and other purely coordinating operations the time of the development of new machines can be shortened by 2-2.5 years.

And take the procedure of certifying new equipment! It is beyond human understanding how complicated and involved it is. It is necessary to submit neither more nor less than 46 documents to the state certification commission, which, moreover, has the right also to demand any additional reports and information. On the average the amount of mandatory documents per item comes to 200 to 300 pages, 3-4 months are spent on their preparation. Tens of people are systematically taken away from intense creative labor.

The situation with the inordinate abundance of reporting documents of various kinds is also not changing. Hundreds of requests literally swamp specialists and the management staff, taking people away from the performance of their immediate duties, although the balance sheet of the enterprise and the forms, which have been established by the Central Statistical Administration, of reporting, which, incidentally, should also be critically reviewed, are sufficient for any analysis. The excessively complicated procedure of

removing obsolete products from production also needs revision. Now the user only has to delay with the drawing up of the order for the development and assimilation of a new item, since he already has the right to shift his own blame onto the shoulders of others--to insist on the production of items which are obviously out of date with respect to the parameters. The producer in this case has to continue without objections the production of inefficient equipment and to bear the losses, indirectly inflicting losses on the national economy as well. In short, there are still more than enough thorns in the way of what is new. It was correctly stated at the conference on questions of the acceleration of scientific and technical progress: it is necessary to seek more persistently and boldly and to put to use all the reserves of the increase of production efficiency and product quality.

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ORGANIZATION, PLANNING AND COORDINATION

STRATEGY FOR S&T PROGRESS: JUNE PARTY CONFERENCE SUMMARY

Moscow VESTNIK STATISTIKI in Russian No 8, Aug 85 pp 3-6

[Article: "The Strategy of Scientific and Technical Progress"]

[Text] The achieved level of the development of the productive forces of the country is posing new responsible tasks for our society. Today the changeover of the economy to intensive forms of development and the substantial reorganization of the planning and management of the entire economic mechanism are becoming a vital necessity and a dictate of the times.

The conception of the rapid socioeconomic development of the country on the basis of scientific and technical progress was formulated at the April (1985) CPSU Central Committee Plenum.

The conference on questions of the acceleration of scientific and technical progress, which was held on 11-12 June in the CPSU Central Committee Plenum, was devoted to specific, urgent measures. General Secretary of the CPSU Central Committee M. S. Gorbachev delivered the report "The Vital Question of Party Economic Policy."

In the report the achievements in the area of economics, culture, education and health care and on the improvement of the living, cultural and personal conditions and as a whole the material well-being of the people were shown. All this is clear evidence of the advantages of socialism and its planned economy.

However, starting in the early 1970's the difficulties in the economic development of the country, which were a direct consequence of inadequate persistence in the reform of structural policy, the forms and methods of management and the very psychology of economic activity, became noticeable. In this connection the task of overcoming the negative trends and improving significantly the state of affairs appeared before the party and the people. "A different approach," it was indicated at the conference, "is ruled out: we cannot embark on the launching of social programs. Urgent tasks on the improvement of food supply and the increase of the production of goods and services for the people face society. It is important henceforth to carry out extensively the construction of housing, to improve health care and to develop education, science and culture."

The need for the acceleration of socioeconomic development, at the same time, is also due to external circumstances, the complicated international situation and the requirement of the strengthening of the defensive capability of our country.

The very great political, economic and social importance of the acceleration of the development of the country also lies in the fact that the Soviet Union should be an example of the greatest organization and efficiency of its economy. The accomplishment of this task is an urgent, partywide and national matter.

Today, when our party is heading toward its 27th congress, when the program documents of the congress are being prepared, the main thing is to identify and put to use all the reserves of the increase of production efficiency and product quality. The reorientation of every enterprise, sector and the entire national economy toward the intensive means of development is our vital necessity.

The conference devoted much attention to the questions of investment and structural policy and the need for their reform. It was indicated that today the retooling of operating enterprises, as well as renovation, which makes it possible to provide an approximately twofold greater return on capital investments than in case of new construction, should become the basic method of management. It is necessary to increase the share of assets being channeled into renovation in the total amount of capital investments from one-third to at least one-half. Projects being newly built should be looked into carefully. For the purpose of concentrating forces and assets it is necessary to speed up the construction of some and to halt or even to temporarily suspend others. A general inventory of the operating productive capital, a program of the renovation of every enterprise and every sector and the rapid replacement of obsolete equipment with new equipment, which will make it possible to obtain the greatest economic and social impact, will be required for the implementation of these measures.

A decisive role in the realization of the scientific and technical revolution belongs to machine building, the growth rate of which it is necessary to increase during the coming five-year plan by 1.5- to 2-fold. Particular attention here should be devoted to the mass production of equipment of new generations, that equipment which will make it possible to increase labor productivity greatly and to insure the changeover to the automation of all production processes. At the same time the task of changing over to the supply of equipment in complete sets and of insuring the firm repair and maintenance of equipment is arising.

Microelectronics, computer technology and instrument making, the entire information science industry are now the "catalyst of progress." And their impact in the national economy depends not only on the increase of the output of computers, but also on skillful use.

Serious tasks are arising in the area of capital construction. Thus far fundamental improvement has not occurred in this sector, which is reducing to

naught the efforts on the acceleration of scientific and technical progress. Inefficient technological approaches in designs, the dispersal of capital investments, the dragging out of construction periods--all this is having the result that even the best designs are becoming hopelessly obsolete. One should already in the designs incorporate efficient approaches, shorten the construction periods, deliver equipment in complete sets and on time to construction projects, establish order in the planning and designing of construction, concentrate capital investments and insure the observance of the standard time of the construction of projects. Construction should be turned into a unified industrial process.

A high rate of development of the economy and the efficiency of the entire national economy depend in many ways on the structure and quality of materials. The shortage of materials is a direct consequence of their low quality, limited assortment, as well as wasteful use.

Today the production infrastructure has become a difficult problem. An appreciable lag is being noticed in transportation, communications, material and technical supply and other sectors. And, as a result, there are large losses.

The main goal of the acceleration of scientific and technical progress is the maximum use of organizational, economic and social factors, order and discipline in all sections and the improvement of the organization of production. In every collective it is necessary to determine those links in which it is possible to achieve the greatest success with the minimum expenditures or else without them at all. "In the consciousness of every Soviet individual," it was emphasized at the conference, "the understanding of the fact that the policy of economy is a means to our wealth and truly the task of all tasks, should be deeply ingrained. This is a matter of the entire party, all the people."

The quality of a product and its competitive ability on the world market are the most precise and generalizing indicator of scientific and technical progress and of the standards and discipline of labor. In this respect appreciable changes have occurred in recent years.

And at the same time it was directly indicated that the quality and the technical and economic level of items remain one of the weak spots of the economy and a source of many difficulties and problems. All this is doing serious socioeconomic, moral and political harm. Product quality and the honor of the Soviet mark should be a subject of the pride of workers and all our people.

Science is the front line of the drive for the acceleration of scientific and technical progress. The outstanding successes of Soviet scientists in all spheres of knowledge and technical progress are universally recognized. And at the same time the decisive turn of science toward the needs of social production and of production toward science is an urgent requirement of today. Basic science, which is the "generator of ideas," should first of all have priority. Academic institutes should broaden substantially the research which has a technical orientation. It is necessary to increase their role and

responsibility for the development of the theoretical principles of fundamentally new types of equipment and technology. The science of higher educational institutions can increase significantly the amount of scientific research work.

Serious remarks were made at the conference with respect to sectorial science. Many of the large number of scientific research institutions of the country, which are subordinate to industrial ministries, are isolated from production and are not aimed at the achievement of high end economic results.

For the elimination of such phenomena it is now already advisable to include the majority of institutes and planning and design organizations in associations and enterprises, which will make it possible to strengthen the plant sector of science.

The advantages of the socialist mode of production are obvious. However, their more complete use requires the thorough reform of the planning and management of the entire economic mechanism and the further consolidation and development of democratic centralism. The essence of this reform lies in the increase of the efficiency of the centralized principle in management and planning, in the greater independence and responsibility of enterprises and in the extensive use of more flexible forms and methods of management, cost accounting and commodity-money relations and the initiative of the masses.

At present a large-scale economic experiment is being conducted in the country. But this is only the beginning, the basis for the development of an integral system of management and administration. "It is necessary to start," M. S. Gorbachev indicated, "with the top echelons. Lenin's idea of transforming the State Planning Committee into a scientific and economic organ, which concentrates prominent scientists and leading specialists, has to be implemented in practice. Quality indicators, which reflect the efficiency of the use of resources, the scale of the updating of products and the increase of labor productivity on the basis of scientific and technical progress, should hold a leading place in the plans." The task of establishing organs of the management of large economic complexes is arising. The functions of ministries are also changing; they should focus the main attention on long-range planning and the more complete use of the achievements of scientific and technical progress. The management staff in sectors has to be reduced substantially, its unnecessary units have to be eliminated and the role of the basic production units--associations and enterprises--has to be increased, having subordinated them, as a rule, directly to the ministries. It is necessary in practice to change these production units over to complete cost accounting, having significantly reduced in so doing the number of plan assignments which are established for them in a centralized manner. The improvement of the structure of management should be closely linked with the strengthening of cost accounting and economic levers and stimuli. Pricing and the increase of its role in the stimulation of the quickest introduction of everything new and advanced require radical improvement.

The extensive use of these economic levers will enable associations and enterprises themselves to earn the assets which are necessary for the increase of the technical level of production and product quality and for social

development. But here they should be given the opportunity to dispose of the obtained assets independently. A direct connection between the results of the work of collectives and the remuneration of their labor should be established without fail. It is necessary to extend the principles of the collective contract to the activity of associations and enterprises.

The conference indicated the need for the elimination of everything obsolete, so that the "anti-expenditure mechanism," which is aimed against negligent managers who strive to take from the state a little more resources and capital investments and to give society a little less, would begin to operate at full capacity.

In other words, the pace of scientific and technical progress depends directly and immediately on the quickest solution of the problem of improving the system of administration and management.

The successful accomplishment of all these large-scale tasks requires profound changes in party work, which, M. S. Gorbachev said, is concerned with the decisive factor of all changes--the human factor. "The main aim today is to accomplish by all steps a change in the minds and sentiments of personnel from top to bottom, having concentrated their attention on the most important thing--scientific and technical progress. Demandingness and once again demandingness--this is the main thing which the formed situation is dictating to us communists. The test by life is most rigorous and uncompromising. Today the party and all personnel are taking it."

In connection with the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress great tasks face the entire system of organs of state statistics. The measures, which were formulated by the USSR Central Statistical Administration, envisage an extensive group of questions which are aimed at their successful accomplishment.

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STATE TECHNICAL POLICY, MECHANISM OF ITS IMPLEMENTATION

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[Article by D. M. Palterovich (Moscow) under the rubric "Theoretical and Methodological Problems": "Technical Policy and the Economic Mechanism of Its Implementation"]

[Text] The Essence and Principles of Technical Policy

One of the most important functions of the socialist state is the formation of an effective and goal-oriented technical policy, as well as a mechanism of planning and economic management, which insures its implementation. By technical policy we understand the choice of the directions of the technical improvement of production, the distribution of assets and resources among them, the identification of their priorities and the establishment of the time and sequence of implementation.

As was noted at the conference on questions of the acceleration of scientific and technical progress, which was held in June 1985 in the CPSU Central Committee, the overcoming of the shortcomings in a number of areas of technical and economic development requires an abrupt change of investment and structural policy and the intensification of the orientation toward the retooling of production, the saving of resources, the sharp increase of product quality and the introduction of the most advanced equipment which yields the greatest economic and social impact.

The concentration of assets in the directions of scientific and technical progress, which insure the intensification of production, that is, its increase primarily due to the increase of the return of each unit of resources of living and embodied labor, is, of course, the central task. The differences between the directions of scientific and technical progress can have a technical and technological, a structural organizational or a reproduction aspect. In the first case it is a question of the priorities of different types of traditional and fundamentally new technology, the mechanization and automization of production, the changeover to systems and sets of machines, the increase of their unit power and miniaturization, the combining of various operations in one unit or line and so forth. In the structural organizational aspect in case of the distribution of assets and

resources the choice between sectors, forms and levels of the concentration and specialization of production, the increase of the technical level of basic or ancillary production, the equipment of the spheres of production or service or the repair of equipment and others comes to the forefront. Finally, the reproduction aspect implies the determination of the optimum periods of the service or replacement of generations of equipment and the search for an efficient combination of the retooling, renovation, expansion and building of new enterprises.

For all the importance of the formulation of an advanced and effective technical policy, the latter will remain a passive tool in the absence of a sufficiently reliable mechanism of its implementation. The formation of this mechanism requires the clarification of a large number of difficult questions, such as: the determination of the need for new equipment, the degree and level of the centralization of the decisions on its development and introduction; the role of goal program methods of management in the solution of major scientific and technical problems, the mechanism of the choice of projects; the means of increasing the interest of enterprises and workers in scientific and technical progress; the search for intensive methods of the introduction, service and technological and program supply of new equipment, which are based on functional specialization.

It is important to formulate the principles on which technical policies should be based. Although their classification in the literature was not found by us, such ones as the unity of the state technical policy and its orientation toward the quickest and broadest introduction of the most advanced achievements of the current scientific and technical revolution (NTR) and toward the gaining of leading positions in world science and technology are most often named or implied.

For all the importance of these principles, it should not be forgotten that, first, their implementation takes place under the conditions of substantial restrictions and, second, along with them it is necessary also to bear in mind a large number of circumstances, without the consideration of which such a complicated and multidimensional concept as technical policy cannot be defined with adequate thoroughness.

The unity of technical policy should be understood in the sense that: the development and introduction of the most important types of new equipment are carried out on the basis of intersectorial national economic goal programs, while the development and introduction of less important types are carried out within the framework of sectorial programs, the assignments of which, being supported by the allocation of the necessary assets and resources, are included in the unified plan of the economic and social development of the country; the main sectors and scientific research and planning and design organizations are specified for the leading directions of the development of equipment; free access to the technical innovations, which have been developed in other associations and sectors, is afforded, as a rule, to any association (enterprise). The unity of technical policy, thus, is insured by state supervision and makes it possible to concentrate efforts on the advanced directions of development.

The orientation of technical policy toward the gaining of leading positions in the decisive areas is insured by the concentration in them of the necessary resources, the training of personnel and the system of the certification of industrial products, in case of which the output of items of the highest quality category at the level of the best world models is stimulated by price markups.

Along with the indicated principles, which reflect the unity of the goals and management, other requirements, which follow from the contradictory nature of scientific and technical progress and the multidimensionality of the development of the technical base of production, should also be at the basis of the policy in question. It is a question of such peculiarities as the orientation of technical policy toward the simultaneous solution of a large number of problems, the consideration of the diversity of the situations in different sectors, regions and enterprises of the country and the multivariant nature of the technical decisions which are being made under the conditions of the limitation of resources. All this brings to the forefront the requirements of the differentiation and flexibility of technical policy, the extensive use of optimization methods of the choice of variants and quick adaptation to the changing conditions.

Unity and Adaptiveness in the Processes of the Implementation of the Achievements of Scientific and Technical Progress

The contradictions between the two groups of principles of technical policy (we will arbitrarily call them the principles of unity and adaptiveness) appear in case of the implementation of almost every major direction of scientific and technical progress. From the standpoint of the radical transformation of production on the basis of the achievements of the scientific and technical revolution the most promising are, first, those forms of automation, which involve the use of computers, numerical control (ChPU), industrial robots and flexible manufacturing systems (GPS's); second, fundamentally new technological processes which are based on the use of electrophysical, electrochemical, plasma, electron beam and other nontraditional methods of affecting the object of labor, high temperatures and pressure and so forth.

Along with these two advanced trends more traditional, but very important ones for production efficiency are also being developed: the increase of the continuity of the action, the unit power and the productivity of units, their miniaturization and microminiaturization, the combination in a single machine of several operations; the improvement of the means of small-scale mechanization and mechanized tools, the development of waste-free, low-waste and energy-saving technologies and technologies, which utilize waste products, and others. An effective technical policy insures, of course, not only the choice, but also the efficient combination of various directions, as well as the combination of technical achievements in each new unit or technological process.

Let us examine the contradictions between the principles of unity and adaptiveness of the technical policy on the basis of individual examples. Let us begin with flexible automated works (GAP's), the development of which, in

the opinion of specialists, marks a new stage of the scientific and technical revolution and the beginning of the era of unmanned technology or technology ihich involves few people. NC equipment is the primary unit of flexible automated works. Its use in machine building is insuring an increase of labor productivity, especially in case of the use of multiple-operation machine tools like the "machining center." At the same time working conditions and product quality improve.

Hence there appears the natural orientation of technical policy toward the rapid increase of the output of NC machine tools. From 1970 to 1983 their production in the USSR increased from 1,600 to 11,400, while in 1984 it increased in value by another 28 percent, having achieved 32.4 percent of the value of all the metal cutting machine tools [1, p 163; 2]. Obviously, the principle of the unity of technical policy requires the quickest transformation of NC equipment into the basis of the machine tool fleet of all metal working enterprises.

However, with allowance made for the principle of the adaptiveness of technical policy the question of the expansion of the production and the stock of NC equipment is being significantly complicated. The analysis of the situation in the area of the use of NC machine tools attests that the policy of the increase of their output is coming up against economic limitations. The price of an NC machine tool is 3- to 5-fold, and at times 10-fold greater than that of an ordinary machine tool. Thus, the price of the model 16K20p lathe of increased precision of the Krasnyy proletariy Plant according to the price list is 5,300 rubles, while the price of the NC machine tool at its basis is 26,800 rubles. The model 1512 vertical boring mill costs 21,700 rubles, while the machine tool, which is similar in functions and is equipped with an NC system, costs 64,600 rubles. An NC machine tool, the price of which is 23,600 rubles, is being produced on the basis of the 2N135 vertical drilling machine which costs 3,900 rubles.

Meanwhile, the productivity of the indicated NC machine tools exceeds the productivity of ordinary machine tools by not more than 1.5-fold, and at times does not exceed it at all. The impact of NC equipment is provided mainly by means of the freeing of a portion of the machine tool operators (in case of the attendance of two or three machine tools by one person), the improvement of the quality of the machining of complicated parts, the decrease of the time of the preparation of production and the expenditures on the manufacture of accessories and the reduction of defective output. However, this impact can be achieved only under the condition of 2- to 3-shift continuous operation with the concentration at 1 enterprise (and best of all in 1 section) of not less than 20-25 NC machine tools, as well as in case of a sufficiently high quality of the software, billets and tools, in case of sterile cleanness and a constant temperature in the rooms and a number of other conditions, which at the majority of enterprises are not being fully achieved.

Even more serious difficulties arose in case of the production and introduction of automatic manipulators with programmed control (industrial robots). A significant portion of them have not been put into operation, are not being used or are not yielding an economic impact [3]. In 1984 13,700 industrial robots were produced in the USSR (nearly 9-fold more than in

1980) [2], while during the 12th Five-Year Plan in case of the maintenance of the growth rate of recent years their production may increase to 100,000. The development and introduction of this equipment involves significant expenditures. Obviously, flexible manufacturing systems, and especially flexible automated works for machining, assembly and other technological process stages of machine building will require an even greater amount. One such system consists on the average of 8-12 units of NC equipment with robotized devices for the storage, transfer, positioning and removal of parts, with control from a computer and can also include automated systems of designing, the preparation of technological documents and technical control, as well as warehouse systems. Such a complex should cost several million rubles.

If we extrapolate the formed trends of the change of the amounts and structure of capital investments in machine building and metal working [1, pp 357, 361], then, according to our calculations, during the 12th Five-Year Plan the means and systems of flexible automation will account for more than a third of all the investments in machines and equipment for these sectors.

But to what extent does the indicated scale of the production and introduction of the latest equipment correspond to the scientifically sound needs and the really existing conditions of production? To what extent, given such a rapid pace and truly enormous scale of introduction, is it possible to guarantee its adequate reliability and conformity to specific needs, what will the level of the readiness of consumers for the efficient use, maintenance and repair of the most complicated types of equipment be? The answers to these questions require thorough technical and economic research. Unfortunately, in a number of cases it is being replaced by inadequately sound decisions, which are turning into significant national economic losses.

In this connection it is necessary to emphasize that technical policy cannot be based only on the intrinsic logic of the movement of scientific and technical progress, on the analysis of the present stage of the scientific and technical revolution or foreign experience. Along with the enumerated factors technical policy at each stage should take into account the existing level of equipment, technology and the organization of production, the availability of adequate stimuli for reorganization and rapid adaptation to the new conditions, the achieved level of the division of labor, the training of personnel, product quality and so on.

One of the peculiarities of scientific and technical development in our times consists in the progressive increase of the degree of dependence of the impact of new equipment on such factors as quality, technological equipment and the organization of production. For example, an hour of idle time of a modern NC machining center, which costs hundreds of thousands of rubles, costs an enterprise tens of times more than an hour of idle time of an ordinary metal-cutting machine tool. Meanwhile, according to the data of statistical studies [3, p 32], in machine building the proportion of machine tools and especially forging and pressing, casting and welding machines equipped with programmed control and industrial robots, which for various reasons were not operating, is appreciably greater than with respect to the corresponding types of traditional equipment. This is obviously connected with the trends of the

"natural economy" and other shortcomings in the area of the maintenance, repair and software of equipment, which is furnished with numerical control and automatic manipulators.

The importance of the organizational prerequisites of the efficient use of highly productive equipment is frequently underestimated. Let us take, for example, just one of them--the high level of concentration of the production of machine building items of specific classes. Robotic complexes and flexible manufacturing systems can be efficient only when this condition exists [4, p 23]. Specialists believe that specialized enterprises for the production of general machine building products could become an efficient sphere of the use of flexible manufacturing systems. Therefore, the efficiency of the development of flexible manufacturing systems, as well as their optimum productivity and cost depends on the solution of a problem which became ripe long ago--the formation of a specialized sector of intersectorial works, perhaps, to no less an extent than on the assurance of the high productivity and reliability of means of automation.

The flexibility of technical policy in this aspect should, consequently, consist in the fact that the number and structure of the flexible manufacturing systems, which are being developed, just as of other highly productive equipment, would be determined subject to the level and nature of concentration and specialization in machine building. The violation of such a comprehensive approach to the development of equipment, technology and the organization of production frequently leads to the inefficient expenditure of assets and resources.

A sufficiently flexible approach is also necessary when determining the economically efficient ratios between fundamentally new, modernized and traditional equipment. Very many specialists see all but the main shortcoming of the operations on the development and introduction of new equipment in the fact that they are concentrated not on fundamentally new developments, inventions and discoveries, but on comparatively minor improvements of existing equipment. They usually cite the fact that only a third of the inventions registered annually find practical application and only 15 percent of them are used at more than 2 enterprises [2]. Work on the modernization of previously developed models of machines frequently predominates in the plans of research and development of many sectorial scientific research institutes and design bureaus. The difficulties, which are connected with the assimilation of the latest equipment in the spheres of its production and use, are being overcome slowly.

Taking into account the importance of fundamentally new equipment as the basis of the changeover to the primarily intensive type of reproduction, the fundamental increase of the productivity and the change of the nature of labor, Yu. V. Yakovets voiced the opinion that "the methods of evaluating efficiency and stimulating technical progress during the period of the revolutionary leap in equipment should open the way first of all to new generations of machines and technologies, while placing obstacles in the way of partial improvements of equipment which at its basis is obsolete" [5, p 23].

However, many instances, when modernization proves to be more efficient than the replacement of old equipment with fundamentally new equipment, are being encountered in practice. Thus, at some machine building plants the equipment of old machine tools with the simplest systems of programmed control and manipulators costs many times less and yields a greater impact than their replacement with expensive new NC machine tools or robotized complexes. The equipment of the operating stock of spinning machines with means of automation, which have been developed in our country, will cost one-twentieth as much as its replacement with new automatic equipment [6].

Obviously, the approaches to the ratio between equipment of a different level of novelty should differ substantially depending on whether we are examining the sphere of research and development or the introduction of equipment. In the sphere of scientific research in experimental design work the main efforts should be directed at the development of its types, which embody the best achievements of the current scientific and technical revolution. In this connection it is necessary to change radically the situation, in case of which a predominant portion of the new equipment is not capable of being patented and is not based on inventions and discoveries. Not only the corresponding goal orientation of the plans of research and development, but also the change of the procedure of stimulating inventors and other categories of workers, to develop new equipment, should play a decisive role here. It is necessary, in particular, to improve the scale of the rewards for inventors and the system of the payment of bonuses for the development of new equipment in such a way that the largest reward would be paid for a major, fundamentally new development, and not for several minor ones which yield a similar impact, as is the case at present.

However, in case of the changeover to series production and introduction the choice of equipment should depend not on the novelty in itself, but on the socioeconomic efficiency, which is determined by a large number of really existing conditions, including the availability of resources, the degree of development of new designs and the preparation of the sphere of their production and use.

Another important task of the adaptive technical policy is to insure the conformity of the power, productivity, dimensional and other parameters of new equipment to the real needs of production and the specific conditions of use. Without the observance of this condition the most advanced and productive equipment will prove to be unprofitable. We have already cited examples of the disproportions between the parameters of machines and the real needs of production [7]. It is possible to increase their number.

In the Moldavian SSR the Khimchistka Production Association in May 1982 put into operation in Kishinev an imported line for the cleaning of rugs costing (with allowance made for transportation costs and installation) 355,500 rubles. Its annual productivity is 698,000 m^2, but the actual utilization in 1983 came to only 5.8 percent of the capacity, in connection with which the cost of the cleaning of 1 m^2 of carpet is 2.3-fold more than the list price, while the losses for the year exceeded 53,000 rubles.

Obviously, the installation of such a productive and expensive line under the conditions of a comparatively small republic did not correspond to the needs and, therefore, could not be efficient [8, p 13].

It is obvious that the most advanced equipment should be purchased only after a detailed economic substantiation and the preparation of the conditions for its efficient use. Here, of course, the greater differentiation of the parametric structure of the equipment being produced and the constant orientation of its producers toward the consumers are necessary.

The Economic Goals and the Organizational Prerequisites

At each significant stage of socioeconomic development among the broad spectrum of goals and directions of scientific and technical progress the tasks and measures, which are connected primarily with the saving of living or embodied labor, come to the forefront. Of course, during each period both labor-saving and material-saving measures are implemented simultaneously in specific proportions, capital-consuming and capital-saving technical innovations coexist. However, trends, which it is necessary to control on the basis of the economic needs which are most urgent at the given stage, are visible through this diversity. The opinion that during the past several five-year plans technical progress was primarily of a labor-saving, but capital-consuming nature, has been repeatedly expressed. From 1960 to 1983 the productivity of national labor increased by nearly 3-fold, while the output-capital ratio for the entire production sphere decreased with respect to the gross national product and the national income by nearly 41 percent. In industry during this period labor productivity increased by 2.8-fold, while the output-capital ratio declined by 35 percent, in agriculture and construction it decreased even more rapidly (calculated according to [1, pp 36, 48]). And although such a trend was a consequence of a large number of factors, the contribution of each of which it is quite difficult to determine, it is well known that at the present stage of the scientific and technical revolution more and more expensive technical designs are being introduced; the cost of equipment, as a rule, is increasing more radically than productivity; the increase of the cost of a unit of productivity of equipment comes, according to our estimates, to more than 3 percent a year;[1] the degree of use use of the parameters of a large number of machines under real operating conditions is decreasing.

The cited figures, as a large number of other data, attests that scientific and technical progress was aimed primarily at the saving of living labor. Material-saving, and especially capital-saving technologies in the majority of sectors and works did not undergo adequate development. A large number of economic conditions contributed to this: the relative inexpensiveness of raw material, fuel and energy resources, which occurred for a long time; the exaggerated notion of the abundance of their reserves; the absence of rent payments; the peculiarities of the economic mechanism, which stimulated more the increase of the volumes of output and labor productivity than the decrease of the materials-output ratio. As for the indicators of the output capital ratio, the task of their improvement (not necessarily their increase, perhaps, only the slowing of their decrease) in practice was outside the sphere of planning and stimulation. The imaginary "free nature" of the overwhelming

majority of natural resources and fixed production capital is by no means conducive to the concentration of the efforts of science, technology and production on their saving.

At the present stage of socioeconomic development the simultaneous concentration of efforts both on the saving of living and embodied labor and on the solution of important social problems is urgently necessary. The demographic situation, as well as the need for the reduction of manual labor, in which in the sectors of physical production (excluding workers in the sphere of repair) more than 40 million people are employed [10], require the continuation and increase of the efforts on the development and introduction of labor-saving equipment, first of all the latest highly productive means of mechanization and automation. At the same time the growth of the shortage and the significant increase of the cost of material, raw material, fuel and energy resources suggest an orientation toward the development of equipment and technology which make it possible to save these resources. It is a question of technologies, which increase the degree of extraction of minerals from the earth and useful components from raw materials, of waste-free and low-waste technologies, of economical motors and methods of obtaining billets, of equipment, which insures the recovery of secondary resources, and so on. It should be taken into account that the expenditures on the achievement of a saving of a unit of material and energy resources, as a rule, are significantly (at times severalfold) less than the expenditures on their extraction or production.

The need for capital-saving technical development is also no less urgent. The decline of the output-capital ratio not only is "eating up" a more and more significant portion of the national economic saving, which is achieved as a result of the increase of labor productivity, but is also having an adverse effect on the structure of the economy, costing the need for the rapid increase of the production of means of production. Such factors as the rapid increase of the expenditures on the improvement of working conditions and environmental protection act in the same direction. In this aspect the requirement of the turn of technical policy toward material-saving and capital-saving designs and decisions is becoming more and more urgent.

The accomplishment of the listed complicated and frequently contradictory goals to a large extent is governed by such organizational and economic conditions as the overcoming of the trends of a "natural economy" in the production of many types of products, the substantial increase of the level of the specialization and concentration of production, the development of advanced forms of the organization of the introduction and maintenance of new equipment and the improvement of the methods of calculating the need for modern means of labor, which insures their conformity to the real conditions of use.

Let us examine these tasks in somewhat greater detail. New highly productive equipment also requires a different organization of production. Given the large expenditures on many types of this equipment, a high level of its utilization and the intensity of use are becoming indispensable conditions not only of capital-saving development, but if only of the relative decrease of expenditures, which insures their recovery in the standard time. However, a high level of utilization, as was already noted, often is not achieved due to

the inadequate concentration of the production of technologically similar products. For example, the lack of the solution of such problems, which became ripe long ago, as the specialization of the output of general machine building products, items made of plastic, the repair and production of tools and accessories, the concentration of logging and saw mill operation at large enterprises and so forth hinder the use of highly productive modern equipment or make it simply unprofitable under the conditions of small-scale production.

It would be a mistake to assume that the development of means of flexible automation are eliminating the urgency of the problem of specialization in machine building, since flexible automated works are capable of being readjusted very rapidly for the output of new items. The sizes of their optimum batch are changing, but the task of concentrating technologically similar parts remains. Moreover, in connection with the sharp increase of the cost of equipment the organization of two- and even three-shift continuous operation is becoming an indispensable condition of its efficiency.

It should be noted that both in theory and in practice the problems of technical policy are frequently considered and solved in isolation of the organizational problems of the introduction and production of new equipment. As a result new advanced machines are frequently developed, but no one takes upon himself the accomplishment of such tasks as the determination of the need for them and the organization of their production, introduction and maintenance.

For example, the production of a number of machines for construction, rail transport and forestry, which were developed long ago and demonstrated their great efficiency, has not been set up for a long time. The organization of the production of equipment for intersectorial use causes the greatest difficulties. The network of institutions, which perform the functions of the introduction of new equipment, needs considerable expansion and strengthening.

For example, the analysis, which was made at a number of enterprises of the Minsk Affiliate of the State Planning, Technological and Experimental Institute for the Organization of the Machine Tool and Tool Building Industry and which showed that even in machine tool building, which is successfully increasing the output of NC equipment, only 13.7 percent of the amount of start up and adjustment work on NC machine tools was performed by specialized organizations, another 15.9 percent was performed by the producer plants, while the remaining 70.4 percent was performed by the very users of the machine tools, attests to the low level of the specialization of these functions. The lengthy time of the introduction and the inadequate preparation of the users for the use of NC machine tools, the idle times of which came in all to more than a third of the worked time, in many ways are explained by this [11, pp 31, 32].

Another most important organizational and economic prerequisite of the efficiency of scientific and technical progress is the radical improvement of the methods of analyzing the need for new equipment. The poor study of the scale and structure of this need frequently hinders the solution of the problems of the development of production capacities and the organization of the output of new items.

It is necessary to make the determination of the national economic need for new equipment and the organization of its use, including the specialization of production, integral parts of the goal program planning and management of scientific and technical progress. In the comprehensive goal programs and plans of the development and introduction of new equipment it is necessary to indicate the organizations which are responsible for the calculation of the need, the identification of the areas of the optimum use, the preparation of the conditions and personnel in the sphere of use of the new equipment, its delivery in complete sets, installation, adjustment, hardware and software supply and warranty service.

Socioeconomic Efficiency as the Basis of Technical Policy

As was already noted, the determination of the directions of scientific and technical progress, the choice and implementation of the versions of new equipment and technology for introduction are the key problems of technical policy. The difficulties of their solution to a great extent are connected with the quite well-known contradictoryness of the methods of evaluating the socioeconomic efficiency of new equipment.

It is a question, in particular, of the contradictions between the national economic and the cost accounting impact, between the indicators of the absolute and comparative economic efficiency, which in a number of cases change not only at different rates, but even in different directions.

It is quite obvious that in case of the determination of technical policy at the level of the national economy, its sectors or subsectors the national economic efficiency serves as the criterion. However, its sufficiently accurate determination is complicated by the impossibility, first, of clearly establishing the mutual influence of various factors, second, of correctly comparing their consequences, which occur at different times, and, third, of giving an absolute estimate of the losses which arise due to the overall limitation of resources [12, p 1094]. The difficulties, which are connected with the calculations of the standards of efficiency, the impossibility of a correct comparison of the economic and social impacts, as well as such circumstances, which go beyond questions of theory, as the lack of reliable accounting of the components of the impact, the tendency for it to be overstated in calculations, the inadequate comparability of nonsimultaneous capital investments due to the dynamics of prices and others are added to this.

In the mentioned work it is shown convincingly that "the sphere of application of the indicators of efficiency for the substantiation of practical decisions is very limited," while "the comparison of nonsimultaneous expenditures and impacts loses economic content as soon as the analysis goes beyond the time limits of the existence of the reproduction structure which brought about the system of economic measurers being used" [12, pp 1096, 1100]. While not calling into question the need for the use of formalized methods of the evaluation of efficiency, the authors at the same time bring to the forefront the content study of each problem and the substantiation of the solutions by the comprehensive analysis of the most different aspects and consequences of their implementation.

However, when accomplishing practical tasks, which are connected with the choice of directions or specific solutions in the area of scientific and technical progress, the need for a sufficiently well-defined quantitative criteria, of course, arises. It is possible to integrate the different aspects and consequences of technical decisions in practice only by the comparison of some indicators or others of the expenditures and results. How is one to overcome the contradiction between the limited importance of the existing indicators of efficiency and the practical needs for economic measurers?

Let us examine in this connection one of the versions of the arising tasks. As is known, the calculations in accordance with statistical data reveal pronounced differences in the level of the efficiency of the basic directions of scientific and technical progress. In 1982 in industry the average recovery time of the expenditures at the expense of the additional profit came to: for measures which pertain to the introduction of advanced technology--2.9 years; for the mechanization of production--4.1 years; for automation--5.8 years; for the modernization of operating equipment--2.8 years and so on.[2]

But do these differences mean that, for example, the assets being invested in automation should be readdressed in other directions of scientific and technical policy? Of course not, since the individual directions of scientific and technical progress are at different stages of development, influence the economic structure differently and have different prospects of development and social consequences. The solution, so it seems to us, is to compare the indicators of the absolute efficiency of the different directions of scientific and technical progress and specific types of equipment not with each other, but with specially developed standards which are differentiated with respect to these directions. Thus, the consideration of the various factors and consequences of some technical decisions or others is carried over to the stage of the elaboration of these standards.

It should be noted that method [14] provides for the use of standards of the overall (absolute) efficiency with respect to sectors, subsectors, comprehensive programs and individual technical and economic problems. However, in practice such standards are not being elaborated. Method [15] does not anticipate their use, although they could serve as an important tool for the substantiation of the efficiency of measures in various directions of scientific and technical progress.

The procedure of elaborating the indicated standards can be depicted schematically in the following manner. In any large sector or in a set of similar sectors a representative group of introduced measures is selected for each direction of scientific and technical progress and, perhaps, also for individual technical and technological process stages. For example, in machine building it is possible in addition to differentiate all the measures in the area of advanced technology by types of technological processes: founding, forge pressing, machining and so forth; in the area of automation, it is possible to group them subject to whether they are implemented by means of traditional automatic machines, semi-automatic machines, NC equipment, versatile manufacturing systems and others.

With respect to each of the selected innovations a check of the calculation and an analysis of the indicators of efficiency are made; atypical measures, particularly such ones, the low efficiency of which is explained by obvious shortcomings of the organization of their introduction, are rejected. The standard is established with respect to the average recovery time of the expenditures at the expense of the additional profit (or with respect to another indicator of the absolute efficiency), which was calculated for a sufficiently large group of measures which were introduced under conditions, which are not less than the normal conditions, and received a positive rating of the experts.

The standards should be revised periodically. Their use will make it possible to create a kind of barrier in the way of the introduction of inefficient technical innovations and to reject for practical use those of them, which correspond to the already achieved advanced level of efficiency of the given direction of scientific and technical progress.

The standard method could also provide invaluable assistance when solving such a complex problem as the consideration in the process of introducing new equipment of several types of social impact, which do not lend themselves to direct economic evaluation, particularly the safety of the worker on the job or his satisfaction with his labor. It is clear that the impact from the increase of the safety, for example, of forge press workers is not limited to the saving of expenditures on compensation for disability as a result of an injury. It is hardly advisable to evaluate in monetary form the impact of the preservation of health and the increase of the sense of safety. If, however, the use of equipment in those instances, when the hand of the stamp operator comes into the active zone of the press, is prohibited by sociotechnical regulations, the equipment of the latter with a manipulator or robot will become just as mandatory as, for example, ventilation is. In light of what has been said the further development and improvement of the system of sociotechnical standards, which are one of the important tools of state technical policy, are necessary. Here the demands being made on the indicated standards are becoming more strict, while technical policy in this aspect is enriched as the economic wealth of society increases.

Another important aspect of the evaluation of efficiency is connected with the need to stimulate fundamentally new promising directions of technical development at the initial stages, when the significant expenditures are not yet yielding a full return and are often not recovered in the standard time. Precisely such a situation has now arisen in the area of industrial robots, flexible automated works and other means of flexible automation. The question, however, is whether such stimulation should be carried out by financing from the budget, by means of the unified fund for the development of science and technology (YeFRNT) or other centralized funds or by indirect methods--by the consideration in the calculations of efficiency of several additional types of impact, which method [15] does not provide for (the public consumption funds, for which the worker being freed accounts; the profit derived as a result of his use in another section of production; the cost of housing and others).

Direct stimulation from centralized funds seems more correct. Here, at least, it becomes clear what assets are being allocated for the development, for example, of robotics and for what period they are being allocated. The producers will be obliged during the period of the receipt of subsidies, which has been specified in advance, to decrease the production cost of the robots being produced to a level which insures profitability for the users. If one allows, as is envisaged in special instructions [16], the possibility of a significant increase of economic efficiency by means of unusual methods of its calculation, the opportunity is thereby created to represent as efficient equipment which in reality is not such. As a result considerable assets and resources, which could be channeled into more profitable areas of scientific and technical progress, will be used for inefficient equipment.

The consideration of such components of the impact of the freeing of workers as the saving of public consumption funds and the decrease of the shortage of manpower resources (by means of special wage coefficients) would, in our opinion, make economic sense only as applied to all types of labor-saving equipment without exception. As for the need for housing, it does not decrease with the transfer of workers to other sections of production. The profit, which these workers will provide at the other works, will be the result not only of their labor, but also of the use of the additional fixed capital, materials, fuel and so on. Therefore, there are no grounds to attribute this entire profit only to the freeing of workers.

On the Mechanism of the Implementation of Technical Policy

The question of the mechanism of the implementation of technical policy is usually reduced in the literature to the methods of the management of scientific and technical progress. As the basic means of accelerating the latter they indicate, in particular, the need, first, to reflect more completely the assignments on new equipment in the plans of associations and enterprises, second, to compensate them for the expenditures of the period of assimilation from the unified fund for the development of science and technology, third, to strengthen the stimuli of the assimilation of equipment of the highest world level and quality by price markups, the payment of additional bonuses and so forth. All these, undoubtedly, are important and necessary stimuli, but, as practical experience shows, they, even after having been put into effect, are insufficient to force enterprises to implement technical measures which are highly efficient for the national economy.

The most important reason, obviously, is that the autonomous system of the management of scientific and technical progress by its content cannot provide the results which are expected from it. It will operate successfully only as a component of the overall economic mechanism.

If, for example, the very fact of the fulfillment of the assignments on the assimilation of new equipment, and not the real impact, over which the user watches, is the basis for stimulation, these assignments can be formally fulfilled even when the conditions for obtaining the impact in the national economy are not insured. If, further, the enterprise obtains a markup on the price of new items which are being produced, but the system of the distribution of the profit is such that the indicated markup increases not the

economic stimulation funds, but the net surplus of the profit, which is turned over to the state budget, the enterprise will not be interested in producing these items. If, finally, the enterprise can always have orders for the sale of its obsolete products, which, moreover, provide an adequate profit, why should it overcome the difficulties which are connected with the assimilation of new items? It is possible to increase the number of such restrictions.

Thus, a necessary condition of the interest of enterprises in the development and introduction of efficient new equipment is the organization of such an economic mechanism, in case of which: 1) the new equipment increases to a sufficient extent the amount of the necessary output, as well as the profit which is left at the disposal of the enterprise; 2) the increase of the profit, as well as of the bonuses cannot be achieved by means of the old product, which should become unprofitable; 3) the independent formation of a long-range file of orders for its products and the stability of economic conditions and standards guarantee the enterprise that the assets, which it is allocating from its own funds for the assimilation or introduction of new equipment, in the future will yield it additional revenues. These, of course, are only the most general demands on the general economic mechanism, which need detailed specification.

However, the system of means and methods of implementing state technical policy includes not only elements of the general economic mechanism and the mechanism of direct planning and economic management of technical progress, but also a large number of structural and organizational elements, which insure the reorientation of assets and resources toward the development of the most promising directions of scientific and technical progress and the close interaction of various sectors, institutions and enterprises, which are taking part in the development, introduction and use of new equipment.

It is a question, in particular, of a new approach to the formulation and implementation of comprehensive goal programs of scientific and technical progress and of the elimination of numerous gaps in the chain: "research--development--production of prototypes--tests--preparation of production capacities--assimilation of production--delivery of complete sets--introduction in the sphere of use--hardware and software supply--maintenance--repair of new equipment."

One of the most important tools of the formulation and implementation of technical policy is, as is known, comprehensive goal programs, and not only scientific and technical, but also socioeconomic programs, not only all-union and intersectorial, but also sectorial and regional programs, since they also contain assignments of a scientific and technical nature. However, the indicated tool is not always used skillfully and efficiently enough.

On the one hand, an inordinate enthusiasm for programs and the aspiration to solve by means of them any problem are being observed. But if all or the majority of problems are covered by them, here, of course, it is impossible to insure the priority of the program assignments. On the other hand, in our opinion, the reduction of all the existing programs into a single system is not being carried out at all, their proper hierarchy and coordination are lacking. For example, such most important socioeconomic programs as the Food

Program, the Energy Program or the program of the mechanization of manual labor, which is presently being formulated, require the solution of a large number of difficult scientific and technical problems. But the corresponding scientific and technical programs do not have a direct structural and organizational connection with the indicated socioeconomic programs.

Several important scientific and technical programs in individual directions of automation: on robotics, flexible automated works, automated systems of control and designing, can serve as another illustration. In the listed directions there are both all-union programs and programs in individual sectors and regions. Since each of them was formulated independently and has its own time of implementation, organizational structure, main organizations and so forth, the necessary interconnection between them is far from always insured.

Meanwhile, all the listed programs are different aspects of one, more general direction--automation. Their importance, sphere of application, priorities, sequence and scale of introduction can be determined, as well as can be substantiated technically and economically only if these programs become components (subprograms) of the unified national economic program of the automation of production and management. Only on the condition of the preliminary specification in the general program of the optimum spheres and scale of the use of each form and version of automation (traditional automatic machines and semi-automatic machines of the rigid type, NC equipment, robotized complexes, flexible systems, computer-aided design systems, automated systems for the control of technological processes, rotary lines and others) will it be possible to distribute state capital investments and resources efficiently among the indicated directions. The unity of state technical policy, so it seems to us, can also be achieved only in case of such an organization of goal program management. A different approach inevitably introduces in it more or less substantial elements of spontaneity.

The standardization and compatibility of various means and systems of automation and their software, the interconnection of automated control systems of different levels and so on are practically impossible without a unified comprehensive program of automation.

However, the formulation of a comprehensive intersectorial program of automation is a complicated task, since such a program is not the sum of the measures, which are being fulfilled by various scientific research institutes, design bureaus, and enterprises, but a system, in which not one element can be omitted. Its formulation requires the preliminary analysis of the entire set of possible objects of automation, the scientific determination of the sphere of efficient use of each of its forms, the standardization of design decisions, the uniting of the efforts of hundreds and thousands of enterprises and organizations of different ministries and departments and the strict consideration of both the resource limitations and the time, which is necessary for the scientific, technical and production preparation of each direction of automation.

The overcoming of the very diverse trends of the "natural economy" in the processes of the development and introduction of new equipment is an important means of improving the mechanism of the implementation of technical policy. Thus, many machine building industries, and often large production associations produce industrial robots, develop for themselves flexible automated works and other means of mechanization and automation and deal independently with their introduction and repair. This inevitably leads to the dispersal of forces and assets, the duplication of research and development, the involvement of insufficiently skilled specialists in the processes of the development and use of new equipment, the lack of the standardization of designs and control systems, the increase of expenditures and other negative consequences.

It is necessary, in our opinion, for the ministries, which are the main ones for specific types of equipment and technology, as a rule, to bear responsibility for the supply in complete sets, installation, assimilation, maintenance and firm repair of their equipment. The role of ministries and departments, obviously, should be not to indicate in a directive manner to enterprises what equipment and technology they are to introduce at their place, and not to distribute among enterprises, for example, NC equipment or robots according to the principle "to all the sisters a set of earrings each," but to create such conditions, under which the introduction of new equipment would be practicable and profitable for them.

The increase of the role of the main ministries in the development of corresponding scientific and technical directions, as well as the establishment of an industry of scientific and technical services should not, however, be accompanied by a monopoly of some organizations or others on specific types of equipment or technology. On the contrary, the effectiveness of technical policy can be insured best of all on the basis of the formation of alternate, multivariant economic thinking and a competitive system of the selection of technical designs and decisions with the participation of an objective extradepartmental commission of experts. It is necessary to grant associations (enterprises) the opportunity to choose not only the designs, but also the suppliers of new equipment or technology, as well as the methods of implementing the designs.

The substantial broadening of the rights of enterprises in the sphere of scientific and technical progress on the basis of the principles of the economic experiment should become one of the main directions of the improvement of the mechanism of the implementation of technical policy. Enterprises should be no less independent in this area than, for example, in the use of economic stimulation funds. This implies, in particular, the rejection of the forcing upon them of such equipment, for the use of which they are not yet ready, and the changeover from administrative to economic methods of managing the processes of the assimilation of new items and the retooling of production.

It is important not only that these processes would provide an additional profit, but also that it would be impossible to obtain it and the deductions from it for stimulation funds (according to stable standards), by producing

old products under the conditions of technically backward production. Obviously, the possibility of choosing a supplier of new equipment and of rejecting the receipt of inefficient items and, finally, the changeover from the funded distribution of means of production to the formation by associations of long-range files of orders for their products along with the other conditions indicated above could play a decisive role in the acceleration and the increase of the efficiency of technical progress.

The question of the level of the centralization of decisions, which insures the unity of technical policy, for example, in the sector, without undermining at the same time the principles of the independence and responsibility of associations and enterprises, merits special examination. It would be incorrect, in our opinion, to assume that the rejection of the still encountered forced imposition on enterprises of assignments on the introduction of individual types of the latest equipment or the granting to them of sufficiently broad opportunities in the area of the formation of the file of orders and the range of new products and the choice of the designer and supplier of new equipment and technology will reduce the possibilities of planning organs, ministries and departments in the area of the formulation of a unified technical policy. On the other hand, the freeing of them from the settlement of similar questions of current planning will enable the indicated organs to implement more purposefully such measures as: the organization of the development of sectorial systems of machines and programs of their implementation, the analysis of the need for new equipment, the identification of priorities and the formulation of programs in the basic directions of scientific and technical progress, the organization of an industry of scientific and technical services, machine service and introduction, the allocation of capital investments for the construction of new significant facilities and so forth. Thus, the freeing of ministries and departments from the current planning of scientific and technical progress will not reduce, but will increase their possibilities in the solution of fundamental problems. The implementation of a unified technical policy will turn into the basic function of the organs of economic management.

FOOTNOTES

1. These estimates basically agree with the data of V. K. Faltsman [9].

2. The dynamics of these indicators is cited in [13, p 160], in which, incidentally, it is shown that the reliability of the data on the efficiency of individual measures on new equipment (according to statistical reporting forms No 10-NT and No 2-NT) is low due to intentional or unintentional distortions of the data on the impact, however, in case of the calculation of the average indicators for sufficiently large groups of measures (on the scale of entire sectors or directions of scientific and technical progress) the deviations of the estimated impact from the actual impact to a significant extent are leveled. The general tendency to overstate the impact, obviously, concerns here all the groups of measures to a more or less equal extent. Therefore, the differences between the average recovery times of the

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expenditures on new technology, mechanization, automation and so on are quite objective.

BIBLIOGRAPHY

1. "Narodnoye khozyaystvo SSSR v 1983 g. Statisticheskiy yezhegodnik" [The USSR National Economy in 1983. A Statistical Yearbook], Moscow, Finansy i statistika, 1984.

2. "On the Results of the Fulfillment of the State Plan of USSR Economic and Social Development in 1984. Report of the USSR Central Statistical Administration," PRAVDA, 26 January 1985.

3. Palterovich, D., "The Conditions of the Efficiency of Flexible Automation," VOPROSY EKONOMIKI, No 11, 1984.

4. Baryshnikov, A. Ya. and Ilin, S. V., "The Economic and Social Efficiency of Robotic Technological Complexes Based on NC Machine Tools," MEKHANIZATSIYA I AVTOMATSIYA PROIZVODSTVA, No 1, 1984.

5. Yakovets, Yu., "The National Economic Impact of Fundamentally New Equipment," VOPROSY EKONOMIKI, No 10, 1984.

6. Dubinin, N. and Zhivetin, V., "A Twofold Gain," SOTSIALISTICHESKAYA INDUSTRIYA, 18 January 1985.

7. Palterovich, D., "Structural Policy in the Production and Use of Machines," PLANOVOYE KHOZYAYSTVO, No 5, 1984.

8. "Khozraschetnyye osnovy ispolzovaniya novoy tekhniki v narodnom khozyaystve (na primere otrasli bytovogo obsluzhivaniya)" [The Cost Accounting Principles of the Use of New Equipment in the National Economy (On the Basis of the Example of the Personal Service Sector)], Kishinev, MolNIINTI, 1984.

9. Faltsman, V., "The Power Equivalent of Fixed Capital," VOPROSY EKONOMIKI, No 8, 1980.

10. Sarkisyan, G., "The Social Program and Labor During the 11th Five-Year Plan," SOTSIALISTICHESKIY TRUD, No 2, 1981.

11. "Opyt vnedreniya i ekspluatatsii stankov s ChPU, robotizirovannykh proizvodstv bezlyudnoy tekhnologii. Tezisy dokladov nauchno-tekhnicheskogo seminara (g. Zhitomir, 9-12 oktyabrya 1984 g.)" [The Experience of the Introduction and Use of NC Machine Tools, Robotized Works of Unmanned Technology. Heads of Reports of a Scientific and Technical Seminar (Zhitomir, 9-12 October 1984)], Moscow, Ministerstvo stankostroitelnoy i instrumentalnoy promyslennosti SSSR, 1984.

12. Danilov-Danilyan, V. I. and Ryvkin, A. A., "Some Methodological Problems of the Economics of Scientific and Technical Progress," EKONOMIKA I MATEMATICHESKIYE METODY, Vol XX, No 6, 1984.

13. Palterovich, D. M., "Planirovaniye tekhnicheskogo perevooruzheniya proizvodstva" [The Planning of the Retooling of Production], Moscow, Ekonomika, 1982.

14. "Tipovaya metodika opredeleniya ekonomicheskoy effektivnosti kapitalnykh vlozheniy" [The Standard Method of Determining the Economic Effectiveness of Capital Investments], Moscow, Ekonomika, 1980.

15. "Metodika (osnovnyye polozheniya) opredeleniya ekonomicheskoy effektivnosti ispolzovaniya v narodnom khozyaystve novoy tekhniki, izobreteniy i ratsionalizatorskikh predlozheniy" [The Method (Basic Principles) of Determining the Economic Efficiency of the Use in the National Economy of New Equipment, Inventions and Efficiency Proposals], Moscow, Ekonomika, 1977.

16. "Instruktsiya po otsenke ekonomicheskoy effektivnosti sozdaniya i ispolzovaniya avtomaticheskikh manipulatorov s programmnym upravleniyem (promyshlennykh robotov)" [Instructions on the Estimation of the Economic Efficiency of the Development and Use of Automatic Manipulators With Programmed Control (Industrial Robots)], Moscow, NIIMash, 1983.

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ORGANIZATION, PLANNING AND COORDINATION

USE OF INVENTIONS, FOREIGN TECHNOLOGY IN GEORGIA

Tbilisi ZARYA VOSTOKA in Russian 7 Jul 85 pp 2-3

[Article by Chairman of the Georgian SSR State Committee for Science and Technology and Lenin Prize Winner Irakliy Zhordaniya: "Create in the Name of Progress"]

> [Text] The April (1985) CPSU Central Committee Plenum adopted the firm policy of the intensification of the national economy of the country by the acceleration of scientific and technical progress.

The progress of the economy to a significant degree depends on the quantity and quality of new inventions, their rapid and extensive introduction in production, so to speak, the full use of the intellectual reserve, which is being created by scientists, engineers, specialists, all inventors and efficiency experts. At present there is a significant scientific and technical potential in our republic. We have staffs of scientists in practically all fields of science. As a whole tens of thousands of people work in science in our republic, among them there are about 26,000 scientists or approximately 1.8 percent of the total number of scientists of the country.

Doctors of sciences make up 5 percent of the total number of scientists of the republic, candidates of sciences make up about 36 percent. Here the proportion of doctors of sciences in the Georgian SSSR in the total number of scientists of the republic exceeds the analogous indicator for the union by 1.8-fold, while the proportion of candidates of sciences exceeds it by 1.2-fold. About 4,500 registered scientific research operations, among which about 20 percent are capable of being protected, are conducted annually in Georgia. Given such indicators and taking into account that basic research is the basis for major inventions, we have the right to expect the significant development of invention at the institutions of the Academy of Sciences, the Ministry of Higher and Secondary Specialized Education and sectorial scientific research institutes of Georgia. However, what picture do we have today? Alas, for the present it is far from satisfactory, if you take into account the potentials of our republic. Precisely due to the underutilization of these potentials in invention the republic is in sixth or seventh place and with respect to the majority of indicators lags behind the average union indicators. Thus, for example, the number of authors, who submitted

applications for inventions and applications for efficiency proposals, per 100,000 people in 1984 was 588, which is approximately one-third as great as the corresponding average union indicator. In all in 1984 1,358 applications (less than 1 percent of the total number submitted for the country) were submitted from the republic. Among the main developers of our inventions the leading role is being played by the Georgian SSR Ministry of Higher and Secondary Specialized Education--211 applications (15 percent) and the Academy of Sciences--175 applications (13 percent). One should point out specially the largest "supplier" of inventions--the Georgian Polytechnical Institute imeni V. I. Lenin. It is the author of 166 applications, which comes to one-eighth of the total number of applications submitted by the republic.

For the introduction and use of fundamentally new technical approaches on a broad scale their high-quality design analysis, the preparation of working drawings and the production of prototypes are required. Higher educational institutions for the present still have limited possibilities of bringing a development up to industrial assimilation and for the most part have only a published description of inventions. It should be noted that the established pilot works at the Scientific Research Institute of High Energy Physics of Tbilisi State University, the Georgian Polytechnical Institute imeni V. I. Lenin and the Special Design Bureau of Scientific Instrument Making of the Academy of Sciences of Georgia have begun to give substantial assistance in the production of prototypes of inventions. But these organizations, of course, cannot meet all the needs. Frequently the lack of technical specifications for inventions hinders the solution of the problem of their introduction.

On the other hand, having examined this process in dynamics, it is necessary to note that the results of the past year of 1984 with respect to all the basic indicators of invention and efficiency promotion exceed the analogous results for 1983. The vigorous work which has been conducted in the republic since the 6th Georgian CP Central Committee Plenum, which outlined a clear program in many directions of the development of invention in the republic, had an effect here. In 1984 the economic impact from the use of inventions and efficiency proposals came to 122 million rubles, which is 36 million rubles more than in 1983, including 53 million rubles (as against 27 million rubles in 1983), that is, twofold more, just from the use of inventions.

As a result of the introduction of inventions and efficiency proposals in 1984 ore than 9,000 tons of metal, which comes to 27 percent of the total amount of metal saved in the republic, 12,000 tons of standard fuel, 42 million kWh of electric power, 3,300 tons of cement, 5,400 m^3 of lumber and so on were saved. The number of conditionally released workers as a result of the use of inventions and efficiency proposals came to 1,945, while the number of those changed over to mechanized labor came to 912.

In 1984 as compared with 1983 the basic technical and economic indicators on invention and efficiency promotion increased at the enterprises and in the organizations of the Ministry of Motor Transport, the Ministry of Highways, the Ministry of Procurement, the Ministry of Health, the Ministry of the Meat and Dairy Industry, the Ministry of the Food Industry and the Ministry of Local Industry and in other ministries and departments of the republic. This

is a logical consequence of the attention which is presently being devoted to the matter of invention and efficiency promotion in Georgia. The victory of the Georgian SSR in the All-Union Socialist Competition on Invention and Efficiency Promotion for 1984 and the presentation of the Challenge Red Banner of the USSR State Committee for Inventions and Discoveries and the Central Council of the All-Union Society of Inventors and Efficiency Experts to the Georgian Republic Organization of the All-Union Society of Inventors and Efficiency Experts were the result of such an approach.

However, the noted increase of the indicators far from means that in our republic everything is all right. It is a question of the fact that the mechanism of the implementation of inventions so far has not been operating efficiently enough in our republic, not to mention the fact that often the time of the introduction of innovations is very long, while this means: by the time of their serious production innovations are simply becoming obsolete.

At the present stage, of course, it is impossible to require the impracticable, namely that all inventions would be introduced, and, of course, it would be incorrect to disperse forces and means for the achievement of a 100-percent rate of introduction. It is more advisable, it seems, to concentrate on inventions which actually promote the development of the priority directions of the national economy and from the introduction of which it will be possible to expect a significant economic impact.

In addition to the use of inventions in our national economy and their extensive introduction, the introduction of inventions on the foreign market is a no less important task. It is a question of the successful conducting of patent and licensing operations which conclude with a license agreement. In recent years there have been definite changes in this area, which is directly connected with currency payments to the republic, the work, which is being performed by the Georgian SSR Council of Ministers, the Academy of Sciences, the State Committee for Science and Technology, ministries and departments, scientific research institutes and other organizations of the republic, is having an effect here. Evidence of this is the fact that whereas during the entire time the republic did not sell a single license, not counting the participation of republic organizations and enterprises as coperformers with respect to the licenses sold by union ministries, today there are already three sold licenses, of them two were during this five-year plan. Moreover, licenses for the production of "matsoni" and "nadugi," the technology of which was introduced at the Tbilmoloko Production Association, were sold last year. The development is ours, but, however, due to the lack of patent experts in the Georgian SSR Ministry of the Meat and Dairy Industry the licenses were presented to the State Committee for Inventions and Discoveries by the union ministry. It is also necessary to speak about the successes in this area of the All-Union Scientific Research Institute of Automation of Production Processes, which already has several sold licenses. In this connection it is impossible not to note the positive work which was performed by the recently established subdivision in the system of the Georgian SSR State Committee for Science and Technology.

In speaking about successes, it is impossible not to say that many ministries and departments of our republic are displaying passivity in the choice of

license themes for their inclusion in the draft of the State Plan of USSR Economic and Social Development for 1986 in the section "The Sale of Soviet Licenses." In response to the inquiry of our state committee on this question such large ministries as the Ministry of Health and others so far have not submitted a single suggestion on the sale of licenses abroad, while the Georgian SSR Academy of Sciences with its mighty scientific potential has submitted only two suggestions.

The need for a new approach to all our foreign economic activity was specially stressed at the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress. This also fully applies to the sale of licenses which govern the high level of scientific and technical thought and patent and licensing work at the local level.

Patent information, which is one of the basic directions of the work of territorial information organs, is of great importance for insuring high-quality patent research. All the work in this area during the 11th Five-Year Plan was organized in cooperation with the main organization in the country in the area of patent information--the Poisk Scientific Production Association of the USSR State Committee for Inventions and Discoveries. Since 1980 an automated system of information notification on new patent receipts has been operating under commercial conditions at the Georgian Scientific Research Institute of Scientific and Technical Information. At present the database contains up to 12 million documents, this makes it possible to make in it a patent search in accordance with any heading of the International Patent Classification during a given interval of time and for any group of countries.

The assimilation of new types of industrial products in accordance with purchase licenses is being carried out today at enterprises of the republic. On the suggestion, for example, of the All-Union Institute of Technology of Low-Power Electric Motors the production of commutators for low-power electric motors in accordance with a license purchased in Italy is being assimilated at the Agregat Plant. The assimilation of micromotors for electric appliances, which are intended for household purposes, is being assimilated here. Three Italian licenses for the production of tractors, motor blocks and engines for them are being assimilated at the Gruzselkhozmash Scientific Production Association. Work on the assimilation of two licenses--English and West German--for the production of laser measurers and so on is being performed at the enterprises of the Analitpribor Scientific Production Association. These and other licenses, it must be said, were purchased for union ministries. The ministries of republic subordination so far have not made attempts to purchase licenses. Now, it is true, the first steps are being taken. Thus, at present the preliminary study of the questions, which are connected with the purchase of licenses for "Aerial Tramways" for the Georgian SSR State Committee for Special Transportation and systems for its automation, has been completed. The question of the purchase for the Georgian SSR Ministry of Local Industry of a license for "Sports Shoes and Clothing" is at the stage of study. The USSR State Committee for Science and Technology is promoting this in every way.

It is necessary to use more extensively on the basis of licenses the introduction in the national economy of foreign scientific and technical

achievements for the gradual retooling of the leading sectors of the national economy of our republic, having in so doing directed the attention of executives of ministries and departments to the intolerability of a superficial approach to the settlement of the question of the advisability of the purchase, the possibility of industrial assimilation and their further efficient use.

The scientific and technical societies, which have already begun to contribute to the holding of public appraisals when settling the questions of both the purchase of foreign licenses and the sale of our own, also can and should voice their own significant opinion here.

The management of efficiency promotion and invention is a very complicated matter and requires careful analysis and coordination. The decisions of the 6th Georgian CP Central Committee Plenum direct attention to such a thorough, practical approach. However, in the republic the implementation of a unified technical policy in this area for the present is not being carried out at the proper level. It is advisable, apparently, to concentrate planning and management in this area in a single department, which carries out the state monitoring of the further development of this work. Our state committee could assume these functions.

The availability of experimental bases of ministries and departments for the development and production of models of the most efficient inventions and efficiency proposals is of great importance. However, even in case of a good experimental base serious obstacles of a material nature can arise. Therefore, it would be desirable, along with the deductions of monetary assets, which industrial enterprises presently make to the fund of the All-Union Society of Inventors and Efficiency Experts, to create the conditions for the transfer of some specific percentage of the saved materials--metals, plastics, cement, fuel and others, for the formation of "a fund for maneuver," that is, a fund which it would be possible to use efficiently for the development of prototypes and the conducting of experiments, without waiting for the allocation of these resources in a planned manner.

In order to make the efforts more effective, it is necessary to familiarize ourselves as extensively as possible with the experience available outside the republic. The Estonian experience, as well as the experience of the Hungarian People's Republic are first of all interesting in this respect.

Important tasks--to bring the republic up to the leading levels in the country--face our inventors, efficiency experts, patent experts, the managerial staff of ministries, departments, enterprises and organizations and public organizations--the All-Union Society of Inventors and Efficiency Experts, scientific and technical societies, the Council of Innovators and trade union and youth organizations. For this it is necessary to step up the work on increasing the ranks of inventors and efficiency experts by at least threefold. In this connection, as Comrade M. S. Gorbachev stressed in his speech at a meeting with the collective of the Dnepropetrovsk Metallurgical Plant, it is necessary to create such conditions so that it would be profitable for collectives to produce and introduce new equipment. Such a favorable climate must also be created for the development of creativity and the extensive use of inventions and efficiency proposals.

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INTEGRATION OF GEORGIAN SCIENCE, PRODUCTION

Tbilisi ZARYA VOSTOKA in Russian 19 Jun 85 pp 2-3

[Article by Georgiy Malashkhiya, department chief at the Scientific Research Institute of Economics, Planning and Management of the National Economy attached to the Georgian SSR State Planning Committee: "It Is Expedient to Use the Indicator of the Science-Worker Ratio in Planning"]

[Text] The need to achieve in a short time the most advanced positions and the highest level of labor productivity, which was emphasized with particular force at the April (1985) CPSU Central Committee Plenum, requires the persistent search for means of the integration of science with production.

The social function of science is realized through the interrelations of science and production. This occurs by the materialization of scientific ideas and the embodiment of knowledge in equipment, in technological processes and the methods of the organization of labor, in new types of materials and finished items and so on. The interrelations of science and production are not confined only to this aspect: production itself has a decisive influence on scientific progress, first, by the fact that its needs for the development and improvement of the tools of labor, technology and the organization of production give new impetus to the progress of science and are conducive to the emergence of new ideas, theories and knowledge, which are aimed at the solution of the problems of the quantitative and qualitative growth of the sectors of the national economy; second, production creates the material and technical basis which is necessary for modern science; third, production insures the use of the achievements of science and technology.

The intensification of the process of the interaction of science and production is leading to their more and more extensive and thorough integration, and not by chance is the "science--technology--production--consumption" cycle figuring to a greater and greater extent in the production process, as a consequence of which science and production are becoming a unified scientific production system. The need for the improvement of the organizational and economic forms of the integration of science, technology and production was emphasized at the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress.

Organizationally the integration of science and production at present is being developed on the basis of contractual relations, creative cooperation, organizational merging and so on. There are, for example, forms of cooperation between academic institutes and enterprises, higher educational institutions and enterprises, the merging of scientific institutions with production units is being carried out.

The Republic Coordinating Council for Science and Technology, which has been established in our republic and for the present is the only one in the country, special organs for the management of scientific and technical progress, ministries and departments, regional organs of management, enterprises and organizations are performing much work in the area of the reform of the economic mechanism, for the strengthening of the contact between science and production.

It is necessary, as was noted at the April (1985) Central Committee Plenum and at the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress, also to develop further the centralized principle in the solution of all strategic problems and to strive for the increase of the responsibility and interest of labor collectives in the end results of work. The new forms of the merging of science with production, particularly scientific production associations, are in many ways contributing to this.

Scientific and production associations, which are insuring the acceleration of the process of the development and introduction of new equipment and technology in practice by approximately 1.5- to 2-fold, have been formed and are operating in Georgia. In the time which has passed since the 6th Georgian CP Central Committee Plenum, contractual relations and creative cooperation on a partnership basis between scientific institutions and enterprises have expanded significantly, multiple-skill brigades of scientists and production workers are being set up for the solution of ripe technical problems. The cooperation in the area of the development and introduction of new equipment and technology between scientific research institutions of the Georgian SSR Academy of Sciences, sectorial scientific research institutes and enterprises, particularly the Institute of Metallurgy of the republic Academy of Sciences and the Zestafoni Ferroalloy Plant, the same institute and the Tsentrolit Plant, machine building plants, the Rustavi Metallurgical Plant, the Scientific Research Institute of the Food Industry and enterprises of this sector and so on, is fruitful.

A number of enterprises of agriculture, construction, municipal services and transportation in individual regions are agreeing to the strengthening of contacts with scientific organizations. A vivid example is Gardabanskiy Rayon, which has been declared a proving ground for the testing and introduction of the achievements of science and technology. The agroindustrial association of the rayon and its subdivisions are constantly turning to scientific organizations with problems which can be solved only with the assistance of scientists. Lasting contacts have been established with such scientific research institutes as the Scientific Research Institute of the Mechanization and Electrification of Agriculture, Farming, Fruit Growing, Viticulture and Wine Making, the Computer Center of the Georgian SSR

Academy of Sciences and so on. The results of the use of the scientific developments, recommendations and advice of scientists in many ways contributed to the achievement of high indicators of economic and social development of the rayon.

The role of the joint efforts of workers of science and the sectors of physical production in the increase of the economic potential and the increase of the material wealth and, in the end, the well-being of the workers of the republic is significant. Suffice it to say that half of the increase of the national income of the republic during years of the 11th Five-Year Plan was obtained by the introduction of the achievements of science and technology. The production of a number of new types of consumer goods was assimilated and expanded, services increased, their quality increased--these and other end results are also a concrete expression of the social function of science.

And all the same the "science--production" cycle for the present still has many problems. The dragging out of the introduction of scientific developments should be regarded as one of the shortcomings in the matter of strengthening the relations of production with science. Practical experience shows that many useful innovations still remain in the "depths" of science without use. Under the conditions of the rapid obsolescence of technical innovations the cases when the period of their development and introduction in practice is prolonged for 10 years and more are completely intolerable.

It is appropriate to cite as an example a number of developments of the Institute of Inorganic Chemistry and Electrochemistry of the Georgian SSR Academy of Sciences, particularly the development of a technology for the production of electrolytic manganese dioxide from low-quality manganese ores, the technology of obtaining screened coke, the electrochemical method of cleaning large-tonnage castings and others. Due to the delay of their use in production, moreover, primarily for subjective reasons, the national economy has suffered large losses.

Practical experience shows that the plans on the introduction of new equipment for the present do not completely reflect the scientific and technical potential of the republic. Suffice it to say that at present the growth rate of the expenditures of new equipment in industry leads the growth rate of capital investments by only 1.2-fold, while in other sectors either does not lead it at all or simply lags behind. And this is when the lead, based on the tasks of intensification, should be substantial. The shortcomings in the management of the "science--technology--production--consumption" cycle are one of the causes of the difficulties which exist in the matter of the fulfillment of the plan assignments on the increase of production efficiency and of economic growth in general. All this convinces us of how urgent radical changes in the management of the integration of science and production are becoming.

Economic levers, first of all planning criteria and indicators, which should completely reflect tomorrow's technical level of production and the assignments on the achievement of this level, can be a powerful means of this integration. The elaboration of these criteria and indicators on a scientific basis at present is assuming an ever increasing importance. This is one of

the basic features of the solution of the problem of the further improvement of the economic mechanism of the management of scientific and technical progress and the national economy as a whole. There serve as criteria of the integration of science and production: the scientific and technical level of production, the pace of scientific and technical progress, the level and pace of the intensification of social production, the level and pace of economic development and the efficiency of social production. They can be used for a general analysis and evaluation of the development of the scientific and technical base of the national economy and the integration of science and production.

A quite broad group of indicators is being used for the more specific, thorough description and planning of individual features of the management of the union of science and production. First of all these are the indicators of the plans of the development of science and technology at the levels of the national economy, sectors, enterprises and associations. It is a question of such indicators as the basic measures on the fulfillment of scientific and technical programs, on the development and assimilation of new highly efficient technological processes and types of products, means of the mechanization and automation of production, especially robots, manipulators and flexible automated works, on the decrease of manual labor and the use of computer technology. There are singled out there: the most important measures on the improvement of management, planning and organization; the indicators of the increase of the technical level of production and product quality, the economic impact from the introduction of measures, the expenditures on scientific research work and experimental design development and so forth.

And all the same all this is insufficient for the achievement of a new level of the unification of science and production and the strengthening of their interrelation, methods and levers, which would guarantee the reliability of the operation of the control "panel" of this process in all the units of the national economy, are needed.

Among these levers the indicators of the planning and analysis of the process of the unification of science and production of a generalized nature, which would aim the managers of enterprises, associations and economic organizations at the search for possibilities of the use of the latest equipment and technology and, consequently, at the expansion of cooperation with science, have an important place. Today it is necessary to use everything new and advanced in work--to act differently, hence, it is wasteful to mark time and to work inefficiently and not in a practical manner. Precisely for this reason it is necessary to give the indicators, which reflect in generalized form the relation of production with science, a most imperative sound, moreover, in such a way that they would occupy a firm place among those parameters, in accordance with which the quality and effectiveness of work are monitored and evaluated, labor is stimulated and managers are held strictly accountable in case of the nonfulfillment of these parameters.

In recent times the concepts "science-intensiveness" and "science-worker ratio" and the indicators, which reflect them quantitatively, have been encountered in both Soviet and foreign economic literature. They are used for

the analysis of the scientific and technical potential, the participation of science in the production process, and technical progress in the national economy, primarily by scientists. Thus far they have not yet found use in practical, planning and analytical activity. It is now already possible to assert that it is advisable to use them in the planning and management of the national economy in general and at the level of enterprises and associations in particular, that is, where the fate of the implementation of measures on technical progress is mainly being decided. They express in a more generalized and direct manner the process of the integration of science and production and the intensity of the development and introduction of innovations. Here preference must be given to the indicator "science-worker ratio," since it expresses more vividly the participation of science in the production process and its merging with the factors of production.

The indicator "science-worker ratio" presumes the consideration of science as a productive force, as a factor of the development of the economy, and namely a certain analogy with the indicators: "capital-worker ratio," "power-worker ratio" and so on. In contrast to the corresponding resources science and scientific knowledge "fuse" with the main components of production and act indirectly through human activity. Science is the source of the social energy of the masses and the growth and improvement of the economy. True, science is materialized in all the components of the productive forces, but the use of a scientific resource should be regarded as the furnishing of the worker with a factor of the increase of the productive force of labor and the intensification of the effect of qualitative sources of economic growth. And this can be shown by means of the indicator "science-worker ratio."

The "science-worker ratio" in dynamics can show the conversion of production, using the words of Marx, into a scientific process and can reveal the peculiarities of sectors and types of products from the point of view of their technical complexity, science-intensiveness and progressiveness. For different works it will be expressed during different periods by a different value. Its comparison with the reference, standard indicator for a specific works with allowance made for its technical level will make it possible to determine the tasks on the strengthening of the contact with specific scientific institutions, depending on which problems await solution. We have all the means for the use of the indicator "science-worker ratio" in practice. In fact, the level can be calculated in accordance with the data which are available at enterprises and in organizations. For example, at the Rustavi Tsentrolit Plant this level for the past 2 years came to 565 rubles, at the Azot Production Association--214 rubles, at the Rustavi Metallurgical Plant--49 rubles and so on.

When planning the "science-worker ratio" the plan assignments can be specified on the basis of the outlined and necessary measures on the development and introduction of the achievements of science and the strengthening of the contact with scientific organizations and the tasks on increasing the technical level and efficiency of production. It is quite clear that one must not approach this indicator mechanically, that it should not always and not everywhere increase uniformly. It is also correct that the absence for a long time of the indicator "science-worker ratio" at an enterprise can serve as if as a signal of a lag behind current requirements, a signal that the enterprise

is not keeping pace with science and technology and cannot solve the ripe economic problems of the growth of production and the increase of product quality and work efficiency. Hence there also arises the question of the need for the implementation of the corresponding measures with respect to making more strict the demandingness on the managers of enterprises and organizations.

In his speech at a meeting with the aktiv of the Leningrad Party Organization Comrade M. S. Gorbachev stressed with satisfaction that the problem of the acceleration of scientific and technical progress and the improvement of management and the changeover of the economy to the path of intensive development in Leningrad is being solved on a large scale, on a scientific basis. The decisions of a 6th Georgian CP Central Committee Plenum clearly direct attention to such an approach and these requirements once again convince us of the advisability of the use of an entire set of measures and a number of economic indicators, including the indicator "science-worker ratio." Its practical use urgently requires the conducting of the corresponding preliminary work.

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REFORM OF MANAGEMENT OF SCIENTIFIC PRODUCTION ASSOCIATIONS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 8 Sep 85 p 2

[Article by Doctor of Economic Sciences K. Taskir (Moscow): "A New Stimulus of Development"]

[Text] At present the industrial ministries are drawing up plans of the organizational structures of management. And an extensive network of powerful scientific production associations (NPO's) is being outlined in each of them. It is proposed to establish several anew, while wherever such associations exist, it is a question of their consolidation. The trend, it must be said, is in the spirit of the times: scientific production associations should and can become the basic unit of the new economic mechanism, which is capable of properly accelerating technical progress.

This work is being performed not from scratch. We have more than 15 years of experience of the activity of scientific production associations. And the conclusions from it, I believe, are of interest. If only from the point of view of not repeating the mistakes of the past.

A peculiarity of the scientific production association consists in the fact that a scientific research or design organization, and not an industrial enterprise, plays the role of the "head" in the association. From this there follow such fundamental advantages as the coverage by the unified system of management of the entire cycle of operations--from scientific research to the assimilation of its results in production--and the direct responsibility for the technical level of "one's own" sector or subsector. The system of contact between science and production is also organized accordingly: the scientific production association develops and turns over to enterprises and production associations new equipment for its series or mass production. Moreover, experimentally checked, developed equipment which has been brought up to the first series. If this product is a custom-made or small-series product and its production at the enterprise or association is economically inadvisable, the scientific production association produces such equipment in amounts, which satisfy the needs of the sector, and sometimes of the national economy as well.

There are also exceptions to this standard arrangement. I have in mind large specialized scientific production associations, whose share in the total

volume of output of the sector or subsector is significant. The Kriogenmash and Kislorodmash associations are an example of this. However, they have the status of a primary unit of management and are subordinate on the same level as the series-producing enterprises of all-union industrial associations. This circumstance brings unbalance into the activity of scientific production associations: the production, and not the scientific, criteria of planning and the evaluation of their activity prove to be in first place. Apparently, when changing over to the two-level system of management it makes sense to give large specialized scientific production associations the right of an all-union scientific industrial association with the full responsibility for the technical level of products and the meeting of the needs of the national economy for them.

There is one danger in this direction. I will cite as an example an event with the former Steklomash Scientific Production Association. Initially a scientific research organization, a planning and design organization, a technological organization, and a pilot plant were a part of it. There were 6 rubles of series output per ruble of scientific research and experimental design work. Given such a ratio the association furnished the entire glass industry quite successfully with technical equipment. And then the ministry decided to include in the scientific production association all the series-producing plants of the subsector. The ratio between the amounts of scientific development and output became 1:25. The association turned into an organ of the management of current production and later was turned into an all-union industrial association. The consequences turned out to be lamentable: the cycle of the development and introduction of new equipment in the glass industry increased by nearly twofold.

Practical experience showed: scientific production associations, to which a scientific research, a planning and design, and a technological subdivision and a pilot and a series-producing enterprise belong, are most advisable and efficient. Depending on the nature and scale of production there can be two or three of them. Or one pilot plant, but in capacity such a plant which can support both experimental operations and the production of series output.

The most important advantage of the scientific production association is its possibilities to eliminate the gap between the links of the "science--production" cycle. This is achieved by means of the combination in time of individual stages of the development, production, and introduction of new equipment, the unity of the management of the efforts of scientists, designers, process engineers, and planners, as well as the stage-by-stage monitoring of the progress of development. But, as practical experience showed, it proved difficult to realize this advantage completely. The system of planning, stimulation, and financing, which was adopted for scientific production associations, did not make it possible to use the potentials of these associations. And now along with the development of the optimum structure it is necessary to make serious corrections in their economic mechanism.

First of all the scientific production association needs a unified plan which is mandatory for all its structural subdivisions. There should be no more than five indicators in it. But such indicators that by means of them it

would be possible to regulate the production of the most important types of new items in physical terms and the expenditures per ruble of output, the standards of the wage fund and the length of the "research--the production and assimilation of new equipment" cycle, as well as the limit of centralized capital investments. All the other indicators are estimated indicators and are not suitable for the evaluation of the results of activity.

For the present the annual and 5-year planning of the work of the scientific production association in practice differs in no way from the ordinary series-producing enterprise. This circumstance cannot but distort their orientation toward the priority of the elaboration of scientific and technical progress. Apparently, special methods of drawing up the five-year and annual plan (of scientific research and experimental design work, the industrial financial plan) of the scientific production association and of calculating the unified standard of working capital and its own system of accounting and reporting are needed. This will make it possible, first, to free them from uncharacteristic themes and products. Second, to expand pilot operations. And, third, to determine specifically the enterprises, which should be retooled and renovated, or to update products in accordance with the development of scientific production associations.

One of the shortcomings of the present scientific production associations consists in the fact that their structural subdivisions perform limited functions and do not completely use their potential, which, as a rule, significantly exceeds the needs of the association. Apparently, it makes sense to give the scientific production association the status of a sectorial scientific and technical center. Then such services as scientific and technical information, patent and license work, technical and economic substantiation, the scientific organization of labor, the training of personnel for work at new equipment, standardization and unification, the forecasting and study of the demand for the output being produced, will be able to broaden the field of their activity and will become sectorial. And in order to increase the responsibility of these services for the quality of work, it is best of all to make them cost accounting services. They themselves will seek clients and will expand the types of scientific and technical services.

Practical experience showed the advisability of financing scientific production associations through supply orders. But they were of benefit, when they encompassed not individual stages of the solution of a scientific and technical problem, but all of it as a whole, including the output of the first batches of items in accordance with the conditions of series production. It is now necessary to support this procedure by the right of the scientific production association to the funds of the client--equipment, instruments, cable products, if the association carries out installation and start-up and adjustment operations at the facilities of the client.

Of course, the scientific production association should bear full material responsibility for the achievement of the planned technical and economic indicators. In case of the worsening of these indicators it is obliged to reimburse the difference between the planned and actual profit and to

attribute the losses to the results of its financial and economic activity. But if the guaranteed economic impact is not achieved through the fault of the client, it is necessary to recover this difference and to transfer it to the incentive funds of the scientific production association.

It seems that the solution of these problems will provide a new stimulus to the development of such a promising form of the integration of science and production as scientific production associations. The essence of the reorganization of their management is seen in broadening their economic independence and providing more opportunities for initiative and socialist enterprise. Another thing is also clear: any broadening of the rights of scientific production associations should go hand in hand with the increase of their material and moral responsibility for the technical level of the sector. Strictly speaking, the point of the existence of scientific production associations should also lie precisely in this.

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FACILITIES AND MANPOWER

TURKMEN INSTITUTE OF SCIENTIFIC, TECHNICAL INFORMATION

Ashkhabad TURKMENSKAYA ISKRA in Russian 28 Aug 85 p 3

[Article: by K. Mukhamov, director of the Turkmen Scientific Research Institute of Scientific and Technical Information and Technical and Economic Research of the Turkmen SSR State Planning Committee: "The Acceleration of Progress"]

[Text] The establishment, development, and improvement of the state system of scientific and technical information in our country are inseparably connected with the name of Vladimir Ilich Lenin, who regarded scientific information on the latest achievements of world science and technology as a matter of vital state importance. According to the view of Vladimir Ilich, without information it is impossible to imagine progress in any field of science and technology. The organization of the Soviet system of scientific information was commenced on 14 June 1921 by the decree of the Council of People's Commissars "On the Procedure of the Acquisition and Distribution of Foreign Literature."

And now Lenin's dream has become a reality. The Soviet Union holds leading positions in technical and scientific progress. His words: "No dark force will be able to resist the union of the representatives of science, the proletariat, and technology" proved to be prophetically correct.

The domestic system of scientific and technical information began to develop at an especially rapid pace during the postwar years. The decree of the USSR Council of Ministers, which was adopted on 29 November 1966, was a program document on the establishment in our country of a unified statewide system of scientific and technical information. The developed structure made it possible to eliminate duplication in work and to allocate duties clearly among the scientific and technical information organs of different levels.

Now 11 all-union, 87 central sectorial, and 14 republic scientific and technical information organs, as well as 113 intersectorial territorial centers and more than 12,000 scientific and technical information services at large enterprises and scientific research and planning and design organizations of the country make up the state system of scientific and technical information.

At the June (1985) conference in the CPSU Central Committee M.S. Gorbachev called the information science industry one of the catalysts of scientific and technical progress.

In our republic the Turkmen Scientific Research Institute of Scientific and Technical Information and Technical and Economic Research of the Turkmen SSR State Planning Committee with centers in the oblasts and scientific and technical information services in ministries and departments, scientific research and planning institutes, as well as at enterprises and scientific and technical libraries became such a catalyst of scientific and technical progress.

During the years of the 11th Five-Year Plan the institute developed and turned over for industrial use an automated system which makes is possible to carry out promptly and over a wide range the retrieval and issuing of information of a sectorial and intersectorial nature and to satisfy each request with the maximum selectivity. In this connection the themes of the permanent requests already for 1985 will be broadened by fourfold and will include more than 400 themes with allowance made for the needs of specialists of enterprises and organizations of the republic. As in the past it will also contain themes on urgent intersectorial problems: "The Saving of Heat, Fuel, and Electric Power," "The Protection of Pipelines and Production Equipment Against Corrosion," "The Monitoring and Control of Product Quality" and "The Mechanization of Loading and Unloading Operations."

The level of production depends not only on the technical and energy base, but also on the level of supply of information. The annual report on the most important domestic and foreign achievements of science and technology, which specialists of the institute prepare, is contributing to this. This information document contains up to 16 urgent problems of the development of the national economy, with respect to which 70-80 recommendations are introduced. These are the problems of the mechanization of manual labor, the fulfillment of the Food Program, environmental protection, and the use of solar energy. The report enables planning organs and the executives of ministries and departments, enterprises and organizations to make sound decisions when preparing and reviewing the plans of economic and social development and makes it possible to evaluate the level of the planned measures with allowance made for the existing trends of development.

However, the analysis of the use of this document by ministries and departments of the republic during 4 years of the five-year plan showed that a number of ministries--construction, the construction materials industry, the meat and dairy industry, rural construction, communications, trade, light industry--did not use the materials of the report at all. In other ministries--agriculture, consumer services, municipal services, the food industry--a negligible portion of the proposed recommendations were used. And only in a few ministries and at a few enterprises of union subordination does the use of the recommended materials come to about 40 percent.

One of the causes of such unsatisfactory use of the information material is the low level of the work on scientific and technical information in ministries and departments, the absence of the goal-oriented search for and

selection of scientific and technical achievements, and the unsatisfactory planning of their introduction. As a consequence of this the innovations being introduced are yielding a negligible economic impact for the sector.

But meanwhile it is indisputable that timely and complete technical information frees from 30 to 50 percent of the working time of researchers with a significant increase of the quality of the development being performed. At those organizations, at which the system of scientific and technical information is at a high level, up to 75 percent of the performed developments are recognized as inventions, labor productivity in the production sections increases by 1.5- to 3-fold depending on the complexity of the production process.

In improving the work on scientific and technical information, the institute is constantly organizing the training of information workers. Some of the specialists undergo training at the Moscow Institute for the Improvement of the Skills of Information Workers. Others are trained at field seminars in the oblasts of the republic. The programs of such seminars include new procedural developments. Last year alone 200 information workers of Ashkhabad, Mary, Tashauz, and Chardzhou oblasts were trained in accordance with the new program.

For the efficient use of the information, which is received on modern media (magnetic tape, microfiche), the institute is constantly engaging in the training of the users of information. For the fifth year specialists of the institute are giving a series of lectures on the principles of information science to the students of the fourth year of the Economics Faculty of the Turkmen Agricultural Institute. However, the experience of this institute for the present is not being used by other higher educational institutions of the republic. A knowledge of the principles of information science will increase the professional level of tomorrow's specialists and will help to properly get one's bearings in the enormous flow of information and to solve promptly production problems.

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FACILITIES AND MANPOWER

SCIENTIFIC RESEARCH INSTITUTE OF RADIOPHYSICAL MEASUREMENTS

Yerevan KOMMUNIST in Russian 24 Sep 85 p 2

[Article (ARMENPRESS): "The Steel Laces of Antennas"]

[Text] The history of the practical use of antennas comes to only a few decades, but their importance is increasing with every day. The dimensions and ranges of their use is extremely diverse and broad: from miniature to enormous space radio telescopes. The operation of modern radar stations, radio relay lines, space communications systems, and so forth is impossible without antennas. The questions of the metrological support and exact measurements of the characteristics of antennas are acquiring great importance.

The All-Union Scientific Research Institute of Radiophysical Measurements (VNIIRI) in Yerevan is the main organization in the country in the area of antenna measurements. Here the first national standards for antennas in the world were established, the State Standard Center for Antenna Measurements, at which the latest achievements in this area are tested in practice and more and more advanced methods of measurements are developed and introduced, was organized.

Today the institute is the custodian of eight state standards for antenna and microwave phase measurements, which ensure the unity of the measurement of the parameters of antenna systems.

For the victory in the All-Union Socialist Competition Among Scientific Research Institutes of the USSR State Committee for Standards in accordance with the results of the first half of 1985 and the large contribution to domestic standardization the collective of the institute was awarded the Challenge Red Banner of the USSR State Committee for Standards and the Central Committee of the Machine Building and Instrument Making Workers Union.

A solemn presentation of the award was held. In presenting it, Deputy Chairman of the USSR State Committee for Standards I. Isayev noted the great national economic importance of the work being performed at the institute, which has become one of the most prominent metrological centers of the country.

G. Daniyelyan, chairman of the Republic Committee of the Machine Building and Instrument Making Workers Union, congratulated the collective of the all-union scientific research institute on behalf of the workers of the machine building and instrument making sectors.

The creative and production successes of the collective were also commended by the Challenge Red Banner of the Sovetskiy Rayon Committee of the communist party of Armenia and the Sovetskiy Rayon Soviet Executive Committee. First Secretary of the Rayon Party Committee M. Mkrtchyan presented it.

Corresponding Member of the Armenian SSR Academy of Sciences P. Geruni, director of the institute, expressed gratitude for the high rating of the activity of the collective. He noted that in the past 2 years the planned amount of scientific research and experimental design development had increased by more than 40 percent.

Having made a special precongress effort, the staff members of the institute adopted higher socialist obligations and resolved to develop and deliver to clients in excess of the outlined program new sets of measuring equipment of the highest precision.

V. Megrabyan, chief of a department of the Armenian CP Central Committee, and Vice President of the Armenian SSR Academy of Sciences Academician A. Iosifyan were present during the presentation of the Challenge Red Banners.

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CONSOLIDATION, LINKING OF COMPUTER FACILITIES URGED

Yerevan KOMMUNIST in Russian 10 Aug 85 p 2

[Article by B. Melik-Shakhnazarov, director of the Armenian Affiliate of the All-Union Scientific Research Institute of Problems of Organization and Management: "The Collective 'Reason' of Computers"; passages rendered in all capital letters printed in boldface in source]

[Text] The modern scientific and technical revolution is intruding upon our life in all spheres of human activity. Its presence is most active in the area of the introduction of microcomputers and personal computers and in robotics, which are sharply increasing the productivity of mental labor and the labor of highly-skilled workers.

But the introduction of microcomputers and robots, just as the dense network of computer centers, which has been established in the republic, can guarantee only local success.

Tens of computer subdivisions and hundreds of large computers are now in operation in the republic. They have more than 15 programs of different types for the calculation of wages, more than 20 programs for the monitoring of fulfillment and about 30 programs for the formation of information arrays. All these programs have "their own" special information language, "their own" codes. The possibility of the exchange of information between computer centers and the offering of reciprocal information services are completely ruled out.

Thus we are building a "tower of Babel," which ought to collapse due to the difference in language of its builders. But how much labor is each collective investing in the development of "its own" program and "its own" system? Many already introduced sectorial automated control systems--ASU's--have only 2 or 3 subsystems of the 12 mandatory ones, that is, are operating NOT IN COMBINATION, WHILE THE COMPUTERS ARE IDLE WHILE WAITING FOR THE ELABORATION OF NEW PROBLEMS.

In his day Academician V. Trapeznikov demonstrated that it is possible to carry out automation only in combination, since at the input and output of any automated system or automatic line there should be systems which correspond to it in productivity and the form of interaction.

What happens, if a separate sectorial automated control system or an automated control system of an enterprise is introduced? It solves a problem in several minutes, while they prepare the information for it in several days. Hence, many problems, which we previously solved by hand quite promptly, now we cannot solve with the aid of a computer even in half a year! Is this really automation in essence, or the pursuit of prestige and fashion?

A similar state of affairs can also arise in connection with the introduction of microcomputers and robots. How many small computers and microcomputers do we have gathering dust under covers in offices and laboratories? By contrast with the latter some of them have lines of users. What is the matter? Computers operate in an intensive mode, if they have been provided with the appropriate information and program service. But is it possible to provide every computer with these attributes? It seems that it is not.

First, it is significantly more expensive to give each computer an individual set of programs. Second, not all can promptly receive and store the necessary data array. This is very labor-consuming and painstaking work which requires great communicativity.

The microcomputer itself has a significantly smaller memory size than large computers. The gap now comes to 10^7, that is, a microcomputer has a memory one 10 millionth as large as the memory of an extra-class computer! It is possible, of course, to increase the memory of a microcomputer and to take steps on providing each computer with information, but what will this cost our country?

From the foregoing it is clearly obvious that the task of introducing microcomputers, robots, flexible automated works and computer-aided design systems (SAPR's) should be accompanied by the no less and, perhaps, even more IMPORTANT TASKS OF INSURING THEIR COMMUNICATION WITH EACH OTHER. This also pertains to large computer centers, where it is possible to concentrate the collective "reason" which has been gained by our society for universal use. Only then will computers, including microcomputers, be efficient.

Can a microcomputer store all state standards, norms and classifiers of cities and other population centers and industrial commodities, norms, data on workers and enormous arrays of statistical data in their memory? Of course not. And it is impossible to insure the transfer of this information by hand to all users. Hence the urgent need for communication and contact with centralized capacious data arrays and with computer centers, which belong to departments which have sound information of COMMON use.

The republic computer centers of the State Planning Committee and the Central Statistical Administration can supply all users with information on planning, standards, classifiers of objects and statistical data. The Computer Center of the State Committee for Standards can store data on standards, the Ministry of Health--on the network of medical institutions and their patients, the Ministry of Internal Affairs--on drivers and motor vehicles, the Computer Center of civil aviation--on air transportation, the schedule of airplanes, tickets for vacant seats and so on.

The question of the advisability of the dispersal of computer-aided design systems (SAPR's) among enterprises is arising in much the same way. For it is more efficient to have a centralized, powerful computer-aided design system, which is rich in information and programs, at a single computer center, which can serve many satellite subscribers and transfer, update and supplement the computer-aided design systems of its own satellite subscribers. Now, for example, the Computer Center of Armproyekt of the Armenian SSR State Committee for Construction Affairs has a computer-aided design system of calculations in construction and serves seven planning institutes of Armenia.

What is it necessary to do for the communication of the numerous computer centers which already exist, for the sharp increase of their profitability and for the tying into them of the microcomputers which are being purchased by a wide spectrum of enterprises and organizations of our republic? It must not be forgotten that schools, tekhnikums and institutions are included among the users of microcomputers. This is a mass user who requires uniform procedural support, software and attentive treatment from the point of view of making the necessary information available. The computer literacy of students dictates a special attitude, since for the present we do not yet have the appropriate instructor-specialists in this area and, what is the main thing, this undertaking must not be discredited in the eyes of our young generation, which can have far-reaching negative consequences.

The analysis made by our institute and the technical and economic substantiation of the question under consideration showed that IT IS MOST ADVISABLE TO ESTABLISH A SYSTEM OF COMMUNICATION FOR COMPUTER USERS ON THE BASIS OF THE DEVELOPMENTS OF THE YEREVAN DEPARTMENT OF THE SCIENTIFIC RESEARCH INSTITUTE OF COMMUNICATIONS OF THE USSR MINISTRY. The Armenian SSR was the first republic which produced a system of the automation of communications on the basis of the computers of the Unified Series of Development of the Yerevan Scientific Research Institute of Mathematical Machines. This system has now united more than 10 message switching centers (TsKS) based on the YeS-1033 computer, that is, these are in fact special computer centers which actually insure the intercomputer exchange of information on the territory of our entire country.

Now the task is for the message switching centers to have the opportunity to switch not only telegraph messages, but also packages of data, which are transmitted via telephone channels, by electronic mail, facsimile communications and the departmental networks of Aeroflot, railroads, power engineering, the supply of gas service and many others. It is necessary to increase sharply the reliability of the data being transmitted, which is realizable by means of special programs of checking and the correction of errors, which any computer makes during calculations.

The existence in the message switching center of the Armenian SSR Ministry of Communications of powerful computer technology and the possibility of its installation in other cities of the republic as well, for the purpose of integrating all the users WITHIN A UNIFIED NETWORK, are making it possible to interface with each other: telegraph subscribers with telephone subscribers, the PD-200 data transmission network with telegraph and telephone subscribers,

the user stations of computer centers with telegraph terminals and so on. Any device of the subscriber: a telephone, teletype, a display with a cathode-ray tube, an ordinary home television, the microcomputer itself, a large computer center, a robot and a flexible automated works, can be tied into the network. Such a network will become the first experimental network in our country, which may be the model network for other republics.

The efficiency of the microcomputers being introduced and the profitability of the already introduced computer centers will satisfy the present requirements, that is, international standards, only if the proposed communications network exists. This is a true service for the manager, the scientist, the instructor, the engineer and the student.

Of course, it is not that easy to create all the foregoing, considerable assets are needed for the purchase of equipment, the designing and construction of message switching centers and the introduction of user stations. The attention of many departments, enterprises and organizations is needed, the corresponding aid and assistance are needed, for each institution will become a participant in the work and a user of the information. We sense a clear understanding of these tasks on the part of the Council of Ministers, the State Planning Committee, the Ministry of Communications and the Central Statistical Administration of the republic, but a much greater practical contribution to the posed problem is required, a fast pace of their solution is needed. Slow implementation not only hinders introduction, but also discredits the idea. Now nearly all the republics are awaiting the results of our work, since it is being performed in accordance with the plan of the USSR State Committee for Science and Technology.

What was presented above is the today of modern equipment, but it is also necessary to think about the future. After all, the network of message switching centers was chosen not by chance. This is connected with the fact that the communications network has an outlet to any subscriber of our country. Hence each of them is afforded the opportunity to communicate with each other according to the principle "each with each," with computer centers and with centralized data banks. The purchase and use of a personal computer are more profitable only if such a network exists.

But the future also makes specific demands on the communications network. Automatic telephone exchanges with the existing relay components should be replaced by automatic telephone exchanges with optical communications cables. Then all the cables with a copper core, which are fed to subscribers, will be replaced by optical cables, which are capable of transmitting 10,000-fold more information. It is sufficient to replace the cable of any subscriber by one optical cable and you can via one channel use cable television, video telephone, data transmission and the teletext system--for the centralized transmission of an electronic newspaper and reports via television and can use the videotext system--for the active requesting of information from the data banks of libraries and organs of scientific and technical information in the form of reports, quotations, advertisements and educational programs.

In the Armenian SSR 38 organizations, enterprises and scientific institutions to one degree or another are dealing with questions which are related to the posed problems. Our republic can and should solve them. Our entire country needs this.

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DEVELOPMENTS OF BELORUSSIAN ACADEMIC INSTITUTES DETAILED

Minsk NARODNOYE KHOZYAYSTVO BELORUSSII in Russian No 8, Aug 85 pp 8-9

[Article by candidate of historical sciences G. Korzenko, junior scientific associate of the Institute of History of the Belorussian SSR Academy of Sciences: "Culminating in Implementation"]

[Text] The intensification of the national economy and the acceleration of technical progress in many ways depend on the combining of the efforts of the scientific centers of all the union republics. The socialist competition between the Academies of Sciences of Belorussia and Lithuania confirms the correctness of this. Whereas in 1973, when the first contract on cooperation was concluded, the coordinating plan encompassed 10 scientific institutions of both academies, during the 11th Five-Year Plan it encompassed 30. In all 40 themes are being fulfilled jointly, that is, practically all the institutes are involved in the elaboration of one urgent problem or another. Creative cooperation is appearing in the conducting of research and the introduction of its results in practice, as well as in the training and exchange of specialists, the use of the experimental base and laboratory equipment, participation in scientific conferences and so on. During the joint developments both academies obtained important results in the area of quantum electronics, computer technology, solid-state and semiconductor physics, heat and mass transfer, geochemistry and geophysics, zoology.

The Institute of Mathematics of the Belorussian SSR Academy of Sciences and the Institute of Mathematics and Cybernetics of the Lithuanian SSR Academy of Sciences are the initiators of the labor competition of scientists of the two collectives. The basic direction of their joint activity is the development of software of computers of the Unified System.

Such a form of cooperation as the holding of joint conferences and seminars on various problems justified itself. Two joint works of Belorussian and Lithuanian physicists were generalized at an international conference in the FRG. As the need arises, the colleagues turn to each other for consultations. The reciprocal criticism and reviewing of dissertation works and the defense of dissertations in specialized councils for the awarding of academic degrees have assumed a broad scale.

The socialist competition of the Academies of Sciences of Belorussia and Lithuania is increasing substantially the return of science, is developing the creative initiative of scientists and is leading to the extension and strengthening of all forms of cooperation. This experience received a high rating. President of the USSR Academy of Sciences Academician A. P. Aleksandrov, in particular, wrote: "The introduction of not formal, but truly socialist, creative competition is contributing to the successes of all its participants. The competition and cooperation of the Belorussian and Lithuanian Academies of Sciences are a successful example of that."

It should be noted that this example is not the only one. Belorussian scientists maintain regular contact with the scientific institutions of the USSR Academy of Sciences and republic and sectorial academies, with the most prominent higher educational institutions of the country and the leading sectorial scientific research and planning and design institutes. Assignments on 108 union programs, which are aimed at the solution of the key national economic problems, are being fulfilled jointly. These are the increase of labor productivity on the basis of the automation and mechanization of production, the improvement of technological processes and the development and use of new equipment and advanced materials. The Belorussian SSR Academy of Sciences jointly with the Academies of Sciences of the Ukraine and Moldavia is working on seven interrepublic scientific research programs. They envisage the study of the geological structure of the territory of the three republics, the formulation of the scientific principles of the efficient use and protection of the waters of the Dnieper, Pripyat and Dniester basins, the scientific and technical problems of the development of nuclear power engineering and others. The addition of the efforts of scientists and production workers of the different republics of our country yields not simply the sum, it increases, it can be said without exaggeration, their possibilities.

The Institute of Heat and Mass Transfer of the Belorussian SSR Academy of Sciences is conducting studies of the phenomena and processes of the transfer of energy and matter in various media and under diverse conditions. The joint development with the Minsk Design and Technological Institute of the USSR Ministry of the Automotive Industry of a new method of the rapid heating of metal to forging temperatures, which does not have analogues in world practice, demonstrated great efficiency. The innovations made it possible to decrease metal consumption by 6 percent. The units have been introduced at bearing plants of Moscow and Saratov, at the Gorkiy Motor Vehicle Works and other enterprises.

The mechanized flow line for the production of medicinal compounds in tablets, which makes it possible to establish a continuous cycle of production, is finding use in the medical industry. Having undergone industrial tests, it is being used at the Kharkov Zdorovye Production Association. Dryers, which increased labor productivity, decreased the cost of the finished product and improved its quality, have been introduced at the plants of medicinal compounds in the cities of Saransk and Penza.

A new product--peat wax--which is produced only in Belorussia, was obtained only through the efforts of scientists of the Institute of Peat of the

Belorussian SSR Academy of Sciences. Let us name the two most important areas of its use. The first is connected with precision investment casting in the USSR automotive industry, the second is connected with a fundamentally new technology of obtaining a synthetic material--foam polyurethane (PPU). It is possible to pour it into molds, while the solidification temperature and elasticity depending on the type of material vary over a wide range. The covers for protection against injuries on the dashboards of the Moskvich and Zhiguli are made of foam polyurethane, the seats of modern passenger cars are also filled with it. The production of several types of anti-adhesive lubricants: ITAN, Svisloch and Belka was organized for the first time on the basis of the wax. The automakers of Togliatti, Ustinov and Zaporozhye are using them extensively.

The composite materials based on aluminum, which were developed at the Physical Technical Institute of the Belorussian SSR Academy of Sciences, are affording great opportunities for reducing the weight of machines and equipment by means of the use of light-weight high-strength shapes. The materials are also suitable for the strengthening of parts by their welding onto working surfaces. The economic impact from the use of composite materials during the production of pistons of diesel engines at the Kiyevtraktorodetal Association and at the turbomotor plant (Sverdlovsk) came to 100,000 rubles.

There is no such sector of the economy of Soviet Belorussia, in which the achievements, which have been obtained by staff members of the Academies of Sciences, sectorial scientific research institutes and higher educational institutions of the union republics, are not being used. Thus, the Minskiy traktornyy zavod imeni V. I. Lenina Production Association is cooperating with 50 scientific research institutes, higher educational institutions and planning and design organizations. Among them are the Main Scientific Research Institute (NATI [State All-Union Scientific Research Institute of Tractors]), the All-Union Scientific Research Institute of Agricultural Machine Building (VISKhOM), the All-Union Institute of the Mechanization of Agriculture (VIM) and others. The MTZ-BPI, MTZ-BIMSKh and ANITRO (Academic Scientific Research Tractor Building Association) voluntary production associations were established. Creative cooperation is contributing to the increase of the amounts and efficiency of scientific research work. Thus, within the MTZ-BPI Association with the enlistment of scientists of the country 98 economic contracts and 159 contracts on creative cooperation were fulfilled in accordance with the joint comprehensive plans, which in all saved 2 million rubles. Developments of the Kiev Scientific Research Institute of Electric Welding imeni Ye. O. Paton--the leading organization of the country in the area of welding and special electrometallurgy--are being used at many industrial enterprises of Belorussia. Its scientists are helping the collectives of the Minsk Motorcycle and Bicycle Plant, the Gomel Machine Tool Building Plant imeni S. M. Kirov, the Gomselmash Plant and other enterprises to master advanced methods of the welding of metals.

The designers of the Granat Scientific Production Association are working on the urgent problem of the mechanization of the metal-cutting machining and stamping of large parts. The machining stamping center, which was developed in collaboration with the designers of the Voronezh Experimental Scientific

Research Institute of Press and Forging Machine Building, has completely automated the labor-consuming process.

For a long time at the Grodno Propeller Shaft Plant they threw out worn-out dies in the scrap metal, while in the tool shop they bored new ones from thick billets 3-4 m long. As a result nearly a fifth of the steel was turned into chips. Specialists of the scientific research institutes of the USSR Ministry of the Automotive Industry, who proposed to set up a section for the remelting of dies directly at the plant, were able to find a solution. The remelting of worn-out dies is being carried out with the use of two coreless induction furnaces. In this way, waste-free production was set up.

Stable creative scientific relations have been established between Belorussian, Moscow, Leningrad, Baltic and Ukrainian scientists in the study of polymers. The leading role here belongs to the Institute of Mechanics of Metal Polymers Systems of the Belorussian SSR Academy of Sciences. The scientists are conducting their research with such scientific institutions as the Physical Chemistry Institute imeni L. Ya. Karpov, the Chemical Technology Institute imeni D. I. Mendeleyev and the Institute of Polymer Mechanics of the Latvian SSR Academy of Sciences. Definite gains have been made as a result of the research. And now many planning and design and production organizations of the country are turning to the Gomel specialists for assistance. The institute maintains creative contacts with nearly 250 scientific research and planning and design centers and industrial enterprises of Moscow, Leningrad, Kiev, Tbilisi, Riga, Khabarovsk and other cities of the country. The collective work of scientists is very efficient and useful. On the basis of the combination of polymers with metals, wood and silicates they developed construction materials with high antifriction and anticorrosive properties. Thus, the Institute of Mechanics of Metal Polymers Systems introduced new composite materials in the industrial equipment of enterprises of the chemical, automotive, light and petroleum sectors. Their use increased by 1.5- to 3-fold the durability of assemblies of machines and decreased the labor intensiveness of production by means of the efficient use of scarce materials. In a year an economic impact of 2.5 million rubles was obtained.

Today the Belorussian Academy of Sciences is performing economic contractual operations in an amount which exceeds 40 million rubles, which comes to approximately half the total amount of financing of scientific research. Moreover, about 60 percent of the contracts have been concluded with organizations of other republics. The institutes of the Belorussian SSR Academy of Sciences are taking part in the elaboration of 66 union and republic scientific and technical problems. Much applied research is being conducted in accordance with common plans with the union ministries of the machine tool and tool building industry, the chemical industry and the industry for mineral fertilizer production.

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STATUTE ON PATENT SERVICES DETAILED

Moscow EKONOMICHESKAYA GAZETA in Russian No 35, Aug 85 p 18

[Model Statute on the Subdivision of Patent, License, Inventing and Efficiency Work of the Enterprise, Organization and Institution]

[Text] In connection with the uniting of the patent divisions with the divisions for invention and efficient promotion the USSR State Committee for Inventions and Discoveries with the participation of the Central Council of the All-Union Society of Inventors and Efficiency Experts in consultation with the USSR State Planning Committee, the USSR State Committee for Science and Technology and the USSR State Committee for Labor and Social Problems approved (the decree of 30 July 1985) "The Model Statute on the Subdivision of Patent, License, Inventing and Efficiency Work of the Enterprise, Organization and Institution." We are publishing it at the request of the readers.

I. The General Provisions

1. The subdivision (division, laboratory)[1] of patent, license, inventing and efficiency work of the enterprise, organization and institution[2] is the basic independent subdivision of the organization and is directly subordinate to the manager of the organization.

2. The manager of the subdivision is appointed and dismissed from his position by the manager of the organization in consultation with the superior organization.

3. The standards of the number of workers of the subdivision are specified by the corresponding ministry (department) with allowance made for the specific conditions of work.

The wage fund of the subdivision is not included in the expenditures on the pay of the management staff.

4. The subdivision is manned by highly skilled specialists, who have a higher education and work experience in the corresponding sector of production and a

specialized education in the area of inventing and patent and license work, as well as by the necessary technical personnel.

5. In its activity the subdivision is guided by the laws of the USSR, the ukases and decrees of the Presidium of the USSR Supreme Soviet, the decrees and statutes of the USSR Government, the Statute on Discoveries, Inventions and Efficiency Proposals, the Statute on Production Prototypes, the Statute on Trademarks, the instructions and clarifications of the USSR State Committee for Inventions and Discoveries,[3] the orders of the ministry, department and manager of the organization, this statute and other enforceable enactments, which pertain to its activity.

6. The patent, license, inventing and efficiency work in the organization is performed with the extensive participation of the council of the All-Union Society of Inventors and Efficiency Experts, the trade union and other public organizations.

7. In case of the drafting of a sectorial statute on the subdivision of patent, license, inventing and efficiency work of the enterprise, organization and institution their tasks and functions are specified on the basis of this Model Statute with allowance made for the specific sectorial features and the nature of their activity.

II. The Tasks and Functions of the Subdivision

8. The main tasks of the subdivision are:

a) the scientific methods supervision of and participation in the conducting of patent research in case of the planning and performance of scientific research and development and other scientific and technical measures for the purpose of increasing the technical level of the machines, instruments, equipment, materials and technological processes, which are being developed at the organization, and of insuring their patentability, patent cleanness and competitive ability on the foreign market;

b) the drafting of long-range and current plans of patent, license, inventing and efficiency work, as well as proposals on its financing;

c) the organization of mass creative inventing and efficiency work, the extensive use when developing new equipment and technology and improving existing equipment and technology of scientific discoveries, inventions, production prototypes and efficiency proposals;

d) the performance of work on the legal protection in the USSR and abroad of inventions, production prototypes and trademarks, on the identification in scientific research of potential discoveries and inventions; the registration and consideration in accordance with established procedure of efficiency proposals; the provision of assistance to authors in the legal registration and the protection of their rights;

e) the monitoring of the use in production of inventions, production prototypes and efficiency proposals, as well as the monitoring jointly with

other subdivisions of the technical level of the research and development, which are being planned and performed, and of the products, which are being assimilated and produced;

f) the preparation of proposals on the patenting of inventions, production prototypes and other scientific and technical achievements and on the sale and purchase of licenses for them;

g) the performance of work on the timely payment in accordance with established procedure of the reward to authors of inventions, production prototypes and efficiency proposals and of bonuses for the promotion of invention and efficiency promotion;

h) the organization of socialist competition, competitions, reviews on inventing, efficiency, patent and license work, as well as measures on the improvement of the skills of workers of the organization in this area.

9. In conformity with the assigned tasks the subdivision performs the following functions:

a) determines jointly with the managers of the scientific research, planning, design and technological subdivisions on the basis of the analysis of the drafts of goal and comprehensive scientific and technical programs and the drafts of plans (supply orders) the themes which are capable of being protected, organizes the conducting of preplanning patent research on them and with allowance made for its results prepares proposals on the establishment of the indicators of the technical level of the machines, instruments, equipment, materials and technological processes, which are being developed and improved, drafts long-range and current plans of patent, license, inventing and efficiency work, as well as proposals on the financing of this work;

b) analyzes the state of inventing, efficiency, patent and license work in the organization and its subdivisions, submits to the management proposals on its improvement, draws up standard and procedural documents and insures their efficient use;

c) carries out the procedural supervision of and takes part in the conducting of patent research at all the stages of scientific research and development of the objects of equipment and technology, in case of the assimilation and output of industrial products;

d) drafts the thematic plan for inventors and efficiency experts on the solution of the key problems of production and organizes competitions on the most important of them;

e) studies jointly with the developers the proposed technical and artistic design approaches in order to determine their novelty and efficiency;

f) draws up with the participation of the authors the materials of the applications for discoveries, inventions and production prototypes, carries out correspondence, accounting and reporting with respect to them;

participates in the appraisal of materials which are being proposed for publication;

g) examines jointly with the technical and economic services the applications for efficiency proposals, gives assistance to the authors in their modification and drawing up, as well as carries out their registration;

h) carries out the monitoring of the state of the design, technological or planning analysis of all the inventions and production prototypes, which have been developed at the organization, and first of all the ones which can be patented. Drafts a plan of measures on the use of inventions and efficiency proposals and monitors its fulfillment. Participates in necessary instances in the establishment of the fact of the use of developed and borrowed inventions.

Keeps an account of the use of scientific discoveries, inventions, production prototypes and efficiency proposals and keeps track of the indication of information on them in accordance with established procedure in planning, technical and accounting documents, as well as in the prospectuses for new items and modes of production and bears responsibility for the reliability of statistical reporting on the patent, license, inventing and efficiency work at the organization;

i) makes on the basis of the reports on patent research an analysis of the indicators of the technical level of the developments which are capable of being protected. Participates in the evaluation of the work and in the settlement of questions on the stimulation of the subdivisions of the organization, which are the developers (researchers);

j) makes the selection and prepares proposals and the necessary materials for the patenting in foreign countries of inventions and production prototypes and the registration of trademarks, organizes their consideration in the scientific and technical (scientific) council or by a special commission of the organization and carries out the monitoring of their passage in competent organs;

k) supervises the observance by foreign firms of the rights, which were acquired by the organization abroad, in accordance with protective documents, organizes their active use in case of the export of products and, if necessary, prepares proposals on putting a stop to the committed violations;

l) analyzes the results of patent and market research, prepares proposals and the necessary materials for the sale of licenses for inventions and other scientific and technical achievements, organizes in accordance with established procedure their advertisement, prepares jointly with competent services proposals on the purchase of licenses or on the carrying out of scientific and technical cooperation with the corresponding foreign firms and organizations, first of all with CEMA member countries;

m) organizes on the basis of patent research the assurance of a patent cleanness of the objects of equipment and technology, which are being

developed, as well as of the objects of licenses and exhibits of international exhibitions and trade fairs;

n) examines directly with the developers the proposals of the USSR State Committee for Inventions and Discoveries and other organizations on the use of inventions, as well as the applications for discoveries and inventions, which are received for the conclusion on the novelty and utility, participates in the preparation of conclusions on the advisability of their use, submits proposals on their inclusion in the corresponding plans of the organization;

o) organizes the patent information support of scientific research and development, prepares proposals on the mechanization and automation of information retrieval operations;

p) participates in the work of the scientific and technical (scientific) council when considering the questions of the planning, stage-by-stage performance and completion of scientific research work and development, which are capable of being protected;

q) participates in the making of calculations of the economic impact, which is anticipated from the use of inventions, production prototypes and efficiency proposals, as well as was actually obtained in production, prepares with the enlistment of economic services the materials for the payment in accordance with established procedure of the reward to authors of inventions, production prototypes and efficiency proposals and of bonuses for the promotion of invention and efficiency promotion;

r) makes available in accordance with the requests of interested organizations and citizens information on the amount of the economic impact, which was obtained from the use of inventions, as well as on the reflection of the fact of their use in state statistical reporting;

s) organizes the participation of the collective of the organization in the All-Union Socialist Competition, in national, sectorial and regional competitions and reviews in the area of inventing, efficiency, patent and license work, holds competitions and reviews in the organization, studies and uses the positive experience of other organizations in this area;

t) gives procedural assistance to public creative associations (multiple-skill brigades, design bureaus), public patent bureaus, patent experts and representatives for invention and efficiency promotion, directs and supervises their activities;

u) elaborates and implements measures on the scientific organization of labor and the improvement of the skills of specialists of the organization in the area of patent, license, inventing and efficiency work, takes steps on their supply with standard procedural and reference literature;

v) prepares proposals on the payment of bonuses to and on other measures of the stimulation of the workers of the organization, who have achieved high indicators in the development and use of highly efficient inventions, production prototypes and efficiency proposals in patent and license work.

III. The Rights of the Subdivision

10. For the assurance of the fulfillment of the tasks and functions, which have been assigned to it, the subdivision has the right:

a) to make checks of the state of patent, license, inventing and efficiency work in the subdivisions and the fulfillment by them of the enforceable enactments in this area;

b) to require the subdivisions and all the workers to make available in good time information on the research and development being performed, which is necessary for the protection of state priority in the area of discoveries, inventions and production prototypes, for the drawing up of the materials of the applications for them, including in foreign countries;

c) to demand in accordance with established procedure from the managers of the subdivisions information on the developments being planned and performed, which is necessary for the comparison of their indicators with the indicators of the technical level of machines, instruments, equipment and technological processes, which has been achieved in the world;

d) to be represented in the scientific and technical (scientific) council, in the commission for the acceptance of completed scientific research operations or their stages, to participate in the work on the evaluation of the technical level of a product and its certification;

e) to submit to the management of the organization proposals on the stimulation of the workers and subdivisions, which are taking an active part in patent, license, inventing and efficiency work, as well as on the institution of disciplinary proceedings against people, who are guilty of bureaucracy and red tape in the use of inventions and the payment of the reward to the authors and of the violation of other norms of legislation;

f) to conduct correspondence with the subdivisions and organizations of the ministry, department, the USSR State Committee for Inventions and Discoveries and the USSR Chamber of Commerce and Industry on questions which belong to its competence;

g) to participate during the consideration in the superior organization or the ministry, the department of questions which are connected with the patent, license, inventing and efficiency work in the organization.

FOOTNOTES

1. Hereinafter the subdivision.

2. Hereinafter the organization.

3. Hereinafter the Goskomizobreteniy.

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NOTED SCIENTIST COMPARES SOVIET-WESTERN SCIENCE ADMINISTRATION

Moscow LITERATURNAYA GAZETA in Russian 24 Jul 85 p 12

[Article by Doctor of Physical Mathematical Sciences Professor Aleksandr Isaakovich Kitaygorodskiy: "Is It Fruitful? It Is Profitable!"]

> [Text] For long years Doctor of Physical Mathematical Sciences Professor Aleksandr Isaakovich Kitaygorodskiy was a regular author of LITERATURNAYA GAZETA. His articles invariably aroused the interest of readers and frequently served as the source of pointed debates.
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> We are publishing the article which the scientist turned over to the editorial office shortly before his death.

I have more than once had occasion to express my opinion in the press on the possible means of improving the organization of scientific work. Today I would like simply to relate several impressions which were brought from foreign scientific business trips. Of course, not in order to make the appeal to borrow all of this immediately--one must, after all, take into account the difference in the conditions "there" and "here." And still, it seems to me, there is much of interest in foreign experience--of both capitalist and socialist countries.

Mr Nezer met me at New York's Kennedy Airport. It was well known to me that I was dealing with a colleague, since I had more than once met Nezer at various congresses and symposiums. It turned out that he works at a small firm which engages in the production of synthetic fiber. This firm has a small institute and a pilot works in a town not far from New York. He, Nezer, is in charge of physical research on fibers.

The next day my host requested permission to acquaint me with the scientific personnel of the institute. About 10-15 people gathered in a small hall: it turned out that the staff of leading scientific associates is also confined to this number. A discussion, from which it became clear that I was dealing with people of high skill, started.

After the discussion, Nezer led me about his possessions. They were not very extensive, but the scientific equipment did not leave much to be desired. The

information center, of which one of Nezer's associates was in charge, created an impression. In 1-2 minutes it was possible to have placed at one's disposal reprints of articles, which not only concern synthetic fibers, but are also devoted to a wide range of questions which have the most insignificant bearing on the business of the firm.

Nezer acquainted me with his printed works and with the research work which he had conducted, and with surprise I found out that the managers of the firm give him time to deal with broad scientific problems.

After lunch we set out to look at the pilot works. Whereas prior to this I was convinced that the general questions of physical chemistry and the theory of intermolecular interactions interest Nezer, now it turns out that he has an excellent knowledge of the production processes in which the firm is engaged. Several times process engineers, who work in the pilot shops, stopped him, shared their concerns with him and discussed whether his laboratory could help in solving some immediate problems of production. It was promised to give answers to the questions, which he had been asked, in about 2 hours.

I spent another day in this small town. We had conversations on the most diverse themes. The question of the interrelations of the management of the firm with scientific personnel interested me most of all. It turned out that the management of the firm in general views very favorably the fact that the staff members are dealing with general questions which do not pertain directly to the tasks of production. At the same time a scientific associate will not hold his job for long, if the chief is not aware of the real benefit which his activity brings to production.

The degree of this benefit can be quite different and it is encouraged in different ways. If a scientific associate is capable of helping process engineers to put on the market new types of fiber, they will value him very highly in both the figurative and the direct sense of this word. On the other hand, if the manager sees that the staff member only rarely helps production with his advice, his wage will be minimal, while it may also happen that they will politely ask him to seek another place of work.

It is worth noting another interesting detail: the wage is a secret, none of the leading staff members knows how much his colleague earns.

A visit to Dr Sloane, a staff member of the very large firm of DuPont, was next. This firm produces many most different chemical products. A multitude of plants, each of which has its own laboratory, are subordinate to it. But in addition to these small laboratories the firm has a central research institute, at which about 3,000 people work. I was also to get a look at this institute.

Sloane was so kind that he put me up at his own house. I lived for nearly a week with my hospitable host. I visited the laboratories and talked with the scientific associates. In general, the picture is the same as that of Nezer. The difference is only in scale. Both general and applied problems of science interest the managers of the numerous laboratories of the DuPont research center. The majority of these laboratories are closely connected with the

laboratories of the plants (of their own firm). People very often come from there for consultations. If a practical idea occurs to some worker of the central institute, he resorts for its testing to the assistance of the plant laboratories and pilot works. Thus DuPont does not have the problem of "introduction."

I had a conversation with one of the managers of the institute. He was a thin, tall Irishman with a head of red hair and a face covered with red freckles. The conversation was businesslike and serious. They showed me a diagram of the interaction and coordination of all the laboratory centers of the firm. The diagram was covered with the names of the managers of the laboratory centers. Among them I encountered several familiar names. At the bottom left there were five or six names of scientists who enjoy world fame. I asked the administrator what relation these scientists have to the firm. "They are our consultants," he answered. "When do you turn to them?" "In the most different cases. Whether the question of the purchase of an instrument costing several hundred thousand dollars is being settled or it is a matter of the advisability of replacing one scientific associate with another and the promise of one job or another."

Then I asked the question which interested me most of all: "You are an industrial company, your basic goal consists in deriving a profit. Therefore, it is clear that the staff members, who do not promote the achievement of this goal, should leave your institution. But frequently a large amount of time is required for the success of scientific work to appear." At first I received a simple answer: "About 6-7 years is absolutely sufficient to be convinced whether a staff member is useful." Then, after being silent for awhile, the administrator added: "You see, of course, we do not tolerate at our institute people who work with insufficient vigor and not to full effect. But we treat different people differently. From insufficiently capable people we require the fulfillment of clearly posed applied tasks. The more capable people work on the solution of basic problems. We allow the possibility of failure in scientific activity of this sort. As for talented people--the generators of ideas--complete freedom is granted to them, they can even engage in pure science which does not have a bearing on the business of the firm. This will be encouraged within reasonable limits."

"But where is the benefit here, where is the profit?" I pressed. "Work in the atmosphere of large-scale science is always profitable," was the answer.

Perhaps, it is worth remembering it.

All more or less rich firms released assets for basic research in the areas which border on their interests. While such giants as DuPont, General Electric or Bell Telephone give talented scientists--I stress: TALENTED [in boldface]--the opportunity to deal with what they want. But since there are not that many talented ones, pure science, in general, is a rather infrequent visitor at the scientific institutions which belong to firms.

The center of gravity of pure science is at universities. There they treat it quite kindly even when it is in the hands of people who are capable only of

playing variations on given themes. Why? Because this is expedient for pedagogical purposes.

Since the conversation has turned to universities.... Recently I had occasion to familiarize myself with these educational institutions in the FRG. In Cologne Professor Hausul, director of the Chair of Crystallography (this is my narrow specialty), received me. I remember that it was vacation. In any case, I did not see students, the four-story building of the chair was empty. Professor Hausul showed me with enthusiasm how an electronic computer helps him to control approximately 100 crystallizers.

"But what do you then do with your crystals?" I asked. "I measure the elastic properties."

I dare assure you that this information was of no practical importance for the crystals, the names of which I read on the bits of paper which were stuck on the crystallizers. In a most polite form I also said this to my colleague. He answered with a smile: "But this is simply interesting."

Herr Professor was engaged in pure science. He explained to me in an intelligible way that this research is already useful for the reason that students usually participate in it. "For in this way they learn much better everything that they should know about crystallography."

I did not succeed in making the acquaintance of the head of the Chair of Crystallography in Karlsruhe--he was absent. But the picture was the same. The professors were also engaged first of all in research which is "simply interesting." The rector of the university obviously approved of such an approach to work.

I was already expecting to encounter the same situation at the third university as well, which I was to visit--in Mainz--but it turned out that here the work was organized in a completely different way. Both the professor himself and his associates were concerned with not pure, but basic and applied science.

The difference in the direction of research at the three chairs which I visited depended mainly on the character traits of the heads. Each head of a chair has a certain minimum of assets (incidentally, not a small one) which enables him, if he does not wish it, not to seek ties either with industry or with the other very numerous and powerful scientific organizations which exist in the FRG. On the other hand, if the head of a chair is sufficiently ambitious and is interested in seeing to it that his research work would be rated highly, he will not act on his own and will set about very actively to find sources of financing.

The style of work at firms and universities, I dare say, differs little in the FRG and the United States, but in the FRG governmental organizations, which are under public control, also play a significant role in science. An example is the Max Planck Society. A good 100 institutes are subordinate to it. Research is being conducted both in the field of pure and basic sciences and in the field of applied sciences. The society is striving to organize its

work in such a way that the problems, which are not included in the plan of action of industrial firms and universities, would not be ignored by the state. For example, the Institute of Plasma Physics, at which in the end they are setting the goal of developing controlled thermonuclear reactors, or the institutes, at which environmental protection questions are being studied, are dealing with such problems.

The Max Planck Society is managed by a board of directors, which consists mainly of prominent scientists, but of which prominent administrators and industrial figures are also members. All the activity of the society is based on elective principles--both the board of directors and the directors of the institute are elected for a specific term. The latter have very great freedom of action, the plans of work depend first of all on them.

The German Research Society is playing a large role in the life of scientists of the FRG. This organization has considerable capital--about 1 billion marks, which it spends in the most different ways: for assistance to individual scientists, for the organization of the joint work of people who work at different institutes, for the financing of individual laboratories. It is natural that this monetary aid has the form of contracts, the term of which is, as a rule, 4-6 years.

From these words it follows that each researcher should make the best of what he has and, when the term of the contract expires, the work should be rated highly by narrow specialists. But if there is not such a rating.... One might not continue further.

Let us now trace the career of a scientific figure who works in the United States or England.

As in our country, there after graduating from the university there are graduates who wish to continue their education in graduate studies. The number of places in them are limited. The term of graduate studies is the same as in our country, that is, about 3 years. Upon graduation the person, who has chosen the path of the scientist, which is strewn with roses and thorns, should submit a dissertation and pass the examination. The dissertation need not satisfy "the requirements of the Higher Certification Commission." And, in general, it is not so much the work as the worker that is evaluated. Those who bring him out into God's world, having conferred the degree "Ph. D." (Ph. D. is expanded as "doctor of philosophy." I remind the reader that in distant times an equal sign was placed between the words "science" and "philosophy"), should be confident that a young person, who is broadly educated and is standing firmly on his own two feet, has set out on the scientific journey.

Education and the joining of the scientific clan also conclude with the procedure of the awarding of the "Ph. D." degree. It will not be necessary to take any more exams and it will not be necessary to write a second dissertation. The direct path to the heights of scientific fame lies ahead.

Incidentally, if after 10 years one also wants to place before his name the letters D. Sc., which means "doctor of sciences," difficulties will not arise. Provided that the scientist has acquired some fame in the world of science and can place on the table an impressive folder of reprints of scientific works, he will be awarded this honor. Some university awards this title (which is somewhat like "honorary figure of science") to the seeker. In recent years fewer and fewer scientists have been concerned about acquiring it: the increase of the number of letters before one's name is neither here nor there. There are Nobel Prize winners who did not worry about obtaining the title D. Sc.

So in what does advancement up the English ladder of a scientific career consist? In advancement up the ladder of positions. The speed of movement from step to step is governed by the abilities, labor and discipline of the scientific figure. The head of a scientific institution systematically keeps track of the successes of subordinates, moreover, he gathers opinions about their work from specialists of other institutions and frequently of other countries, who, however, belong to one narrow clan of specialists.

The time may come when a scientific figure wishes to be named a member of some academy. If his colleagues rate him highly enough, this task is accomplished relatively easily. Election as a member of an academy of sciences does not give special advantages, as well as adds hardly anything to one's fame. Therefore, many scientists with a world name avoid the unnecessary fuss which is inevitably connected with obtaining this title. The election of a scientist as a member of the London Royal Society is, perhaps, an exception. This membership is valued highly. It enables the scientist to obtain with significantly greater ease money for increasing the amount of his research.

I hope that the basic differences between what the situation is "there" and "here" are obvious to the reader who knows the situation in our science. "Here" advancement up the ladder of a scientific career is clearly connected with degrees and titles. There is practically complete indifference "there" to these "embellishments." An enormous amount of work on the writing and defense of dissertations, which satisfy the innumerable requirements of the Higher Certification Commission, work, which frequently is annoying for its meaninglessness and diverts one from real work and which is not conducive to a broad, all-round education, is not necessary. Such a situation, when degrees and titles would be reliable shelter for idleness or senseless activity, which no one needs, is inconceivable.

Thank God, we have people who love science--its successes are due to this.

Another difference concerns labor discipline and the verification of the suitability of a scientist for the held position. "Here" the approval of the reports of the heads of laboratories and the reelection of people to administrative posts are a mere formality. Scientific councils made up of specialists, the majority of whom have a very poor understanding of the sphere of activity of their colleague, judge the work. "There" the commissions, I repeat, are made up of narrow specialists who work at the most different institutions and even in different countries. I, for example, had occasion to

report my opinion on the work of colleagues to the directors of scientific institutions of the FRG and France.

Such a state of affairs leads to the observance by staff members of all ranks of the strictest discipline and to such a workday in which there is not a free minute. A scientist, if he is ambitious or aspires to a higher wage, ponders over what direction to give his work so that it would be of real benefit and (or) would win the respect of his colleagues. The role of the scientific administrator reduces merely to keeping a close track of the activity of his subordinates. He does not take part in their scientific work and is not a coauthor of their works.

A few words on the allocation of money for science.

Here is what a well-known English scientist wrote to me "You ask me how one is to obtain money for research work. In Great Britain a large portion of the money for basic research is obtained through research councils which manage the assets allocated by the government. There are four such councils--for science, technology, agriculture and medicine. Each council forms a large number of commissions in narrow specialties. Highly qualified scientists are members of the council. If I need money to purchase equipment or to increase the staff of my associates, I write a brief (six pages) proposal which is addressed to one of the mentioned councils. In it the goals of the work should be indicated and the reason why money is needed for this work should be given. My proposal is sent to a large number of scientists--narrow specialists in my occupation. Their opinions and my proposal are reviewed by the corresponding commission. If they refuse me, I attempt to turn to another address. The commissions and councils may find themselves in a difficult situation, if the amount of the requests for money of different scientists exceeds the amount which the government releases. In this case open competition takes place among the different scientists. He, who has the greatest prestige and whose conclusions are most convincing, wins. The government does not take any part in the distribution of money: this is the prerogative of the councils and commissions."

What conclusions should be drawn from everything that has been said? And what, strictly speaking, that is useful can be derived from the foreign experience in this area? The reader is free to direct attention first of all to one thing or another. In the developed countries of the West the approach to who should engage in pure science and who should engage in applied science is completely different than in our country. There is there nothing like the multitude of academic institutes, which are focused primarily on problems of this very pure science, such as our country has. Such science constitutes the prerogative of universities and is as if a byproduct of the educational process. To all appearances, within the walls of these educational institutions it is quite well off (take if only the number of Nobel Prizes which are received by staff members of universities).

As to applied science, it, in reality, has been directly included in the scheme of production. The most important advantage of this is tireless, almost automatic control over the efficiency of research. After all, it is clear: no firm will tolerate the fruitlessness of the scientists to whom it

pays considerable money. It is impossible to imagine such a situation when you settle accounts with it with reports which no one needs. This is simply nonsense.

Once again I will say: I am not calling for the blind copying of such an organization of scientific research. But, I believe, it is all the same worth thinking about what of value it is possible to borrow.

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OVCHINNIKOV ON PERTINENT PROBLEMS FACING SOVIET S&T

Moscow MOSKOVSKAYA PRAVDA in Russian 10 Aug 85 p 2

[Interview with Vice President of the USSR Academy of Sciences Academician Yuriy Anatolyevich Ovchinnikov, chairman of the Interdepartmental Scientific and Technical Council for Problems of Physical Chemical Biology and Biotechnology attached to the USSR State Committee for Science and Technology and the Presidium of the USSR Academy of Sciences, director of the Institute of Bioorganic Chemistry imeni M. M. Shemyakin of the USSR Academy of Sciences and Hero of Socialist Labor, by MOSKOVSKAYA PRAVDA science commentator Professor L. Sorin: "The Leaders by Right"; date and place not specified]

> [Text] At the April (1985) CPSU Central Committee Plenum and at the conference in the CPSU Central Committee on questions of the acceleration of scientific and technical progress the question of the need for the utmost increase of the role and responsibility of academic and sectorial science for the development of theoretical principles and fundamentally new types of equipment and technology, which are aimed at the end, specific, appreciable national economic result, was urgently raised.
>
> MOSKOVSKAYA PRAVDA is beginning the publication of a series of interviews with prominent scientists, executives of academic and sectorial scientific institutions and executives of departments in order to evaluate the contribution which is being made by Moscow science and Moscow scientists to the acceleration of scientific and technical progress and to find means for its acceleration.

Moscow is the center of the largest academic and sectorial scientific institutions which belong to various ministries and departments. The role of these scientific institutions in the accomplishment of the tasks posed by the party is great and diverse. Moscow academic institutions act as the centers of basic science in the majority of fundamentally important directions, while scientists of the capitol are among the pace-setters of the campaign for the utmost acceleration of scientific and technical progress.

What is the role of basic research, what is the degree of responsibility of academic scientists, what is their "right to err" today, when every day is precious, when one should depart from the traditional evolutionary methods of the development of science and the use of its result in industry and in the national economy?

Responding to these questions, Academician Yu. A. Ovchinnikov, vice president of the USSR Academy of Sciences, chairman of the Interdepartmental Scientific Technical Council for Problems of Physical and Chemical Biology and Biotechnology attached to the USSR State Committee for Science and Technology and Presidium of USSR Academy of Sciences, director of the Institute of Bioorganic Chemistry imeni M. M. Shemyakin of the USSR Academy of Sciences and Hero of Socialist Labor, said:

[Answer] First of all it is necessary to note that in our country the question of the need to achieve the highest world level in all the most important scientific directions, as well as the need for the development of an entirely new system, which insures the immediate, but necessarily economically sound use of the achievements of science in practice and in the national economy, has been posed for the first time in such an extremely significant and pointed manner. This is the goal and this is the only means to the quickest accomplishment of the tasks posed by the party. Undoubtedly, Moscow science both in spirit and in achievements is the leader in domestic science, and it should not lose such a position of its.

What is necessary for this? To start with let us emphasize: basic science should take into account the interests of the economy. It is impossible to develop an idea, without realizing the requirements of the times. For example, in biology the situation in the past several years has changed fundamentally. Our results go directly from the laboratory table to production.

The medicinal compound interferon, which was developed by us jointly with the microbiological industry, can serve as an example.

The work experience of our institute shows that should constantly set himself such goals, which apply to the sphere of basic research which is capable of turning into a practical task, and this task should be fulfilled. That is, it is necessary or ready in the plans to take into account all the aspects of the assimilation by industry of the results of basic developments. That is what the situation is both in the area of basic operations on bioorganic chemistry and in the area of biotechnology. Today pilot plants, by means of which it is possible in practice to check the results of basic research, are being established at a number of institutes of the USSR Academy of Sciences, and not only of the physical chemical type, but also at biological institutes. At them we are capable already today of developing compounds which are necessary for the conducting of serious medical tests.

[Question] You have touched upon the questions of planning, relying on the work experience of your institute. Probably, this experience should be universal.

[Answer] The management of the USSR Academy of Sciences holds the point of view and is urgently implementing it that priority should be given to planning, that it must be made consistent planning, which is distributed in depth and yields the palm to what today actually governs the acceleration of scientific and technical progress. The strictest planning discipline and executive discipline in the implementation of plans are necessary. Today shortcomings also exist precisely in this matter.

The conferences held in the CPSU Central Committee, in the Moscow City Committee of the CPSU and at the USSR Academy of Sciences are forcing us to revise the former methods of planning, which do not conform to the tasks of today. I am convinced that specific planning is necessary, it is necessary to plan the outcome, to plan success.

[Question] A priority task--to promote in every possible way the acceleration of scientific and technical progress--has been set by the party for Soviet science. The evolutionary, extensive period of the development of science and technology should give way to a revolutionary leap. Here, obviously, the priority of specific scientific direction should be taken into account.

[Answer] Quite correct. At the April (1985) CPSU Central Committee Plenum and at the conference in the party Central Committee on questions of the acceleration of scientific and technical progress the main directions were indicated: machine and equipment building, computer technology, power engineering and chemistry, biotechnology, ecology and environmental protection. I believe that this is the minimum at which we should be in the most advanced positions.

I will cite the example of the Institute of Bioorganic Chemistry. We also studied living nature earlier, especially at the level of elementary processes in the living cell. Today we have achieved an imcomparably higher level: we have begun to change living matter in the needed directions which interest us, we have begun to obtain the necessary practical results. We are transforming the genetic systems of microorganisms, for example, of bacteria which are capable of producing human proteins. In other words, we are developing hybrids in the interests of man, for the solution of a specific practical problem, by completely controlling the functioning of the biological system not only under laboratory conditions, but also under the conditions of industrial production.

[Question] Obviously, the Food Program is one of the most important directions, in which scientific and technical progress should be accelerated in every possible way, in which revolutionary changes are required. What is the role of academic science, in particular, the biological sciences in its implementation ?

[Answer] Today we have a bottleneck--agriculture. It is necessary in the immediate future to introduce here advanced, progressive developments, for example, methods of producing new strains of plants--frost-resistant, drought-resistant and so on. This problem is not simple. It is a question of carrying out hybridization, of developing new strains of plants, in essence,

in a directed manner, based on the most up-to-date notions about how one property of a plant or another is recorded in the genetic system.

Of course, the role of intuition and luck, which are characteristic of the evolutionary methods of the former traditional breeding, is also great here. But conventional breeding, unfortunately, is a slow process. Today it cannot satisfy us. Today the leading Moscow institutes have a new ideology in these questions, but this ideology should actually be used in the fields and at breeding stations. The most prominent academic institutes of the USSR Academy of Sciences and the All-Union Academy of Agricultural Sciences imeni V. I. Lenin should turn more resolutely to the vital needs of practice, should set up support centers--I will call them biotechnological centers--directly in the main agricultural regions and should work there together with experienced breeders.

We have conducted a number of useful discussions of food problems at the USSR Academy of Sciences jointly with the All-Union Academy of Agricultural Sciences imeni V. I. Lenin. Our joint program of work is advancing successfully, but for the present still slowly. But time does not wait.

In order to realize more rapidly the available potentials, we are setting up everywhere throughout the countries several major--not in size, but in importance--modern biotechnological centers. They should actively participate in the accomplishment of the tasks of the Food Program. Literally in a day or two one of the groups of Moscow scientists is leaving for Krasnodar Kray for the discussion of the plans of joint work with scientists of this most important granary of the country.

[Question] Yuriy Anatolyevich, in the problem of the acceleration of scientific and technical progress the problem of the introduction of scientific developments in production and in the national economy is, as is known, the question of questions. Scientists and production workers do not always find a common language.

[Answer] In all instances I yield the palm to the level of scientific developments. I would like to emphasize two conditions of the settlement of these questions. The first: only such scientific developments, which are at the world level or higher than it, can and should be introduced.

The second condition is also no less important: the scientists, who deal with basic science, and the authors of scientific developments should be prepared for a constructive dialogue in the same language with production workers. This should be a dialogue of like-minded people who are striving for the achievement of one common goal. It should not be thought that it is necessary to introduce immediately any idea which has been advanced by scientists. Any idea, no matter how promising it seems, should undergo a detailed examination, a critical analysis and evaluation from the point of view of its degree of economy. I want to elaborate: the idea should be economical not in general, but in a specific situation, from the point of view of a specific economy.

The determination of the degree of priority and urgency of introduction should be the business of special organs, which are made up of the most competent specialists in the given scientific sphere, representatives of planning organizations and executives of ministries and departments. However, I emphasize, in such an interdepartmental coordinating organ scientists should have the final say.

The interdepartmental council, which operates under the USSR State Committee for Science and Technology and the USSR Academy of Sciences and in the sphere of which the basic, most important problems of physical chemical biology and biotechnology are included, can serve as an example. Very prominent scientists and executives of a number of ministries--the USSR Ministry of Health, the USSR Ministry of Agriculture, the USSR Ministry of Higher and Secondary Specialized Education, the Main Administration of the Microbiological Industry, the All-Union Academy of Agricultural Sciences imeni V. I. Lenin, the USSR Academy of Sciences, the academies of sciences of the union republics, the USSR Academy of Medical Sciences and others--are members of the council. A fundamentally important feature of this council is the fact that, in accordance with the instructions of the government, the recommendations of the council are mandatory for all ministries and departments which are concerned with the indicated problems. The council determines the priority of the introduction of scientific developments, and if one idea or another by the time of introduction has already fallen behind the world level, they reject it.

[Question] Should one believe that a direct means to the solution of the problem of introduction has been found, or nevertheless specific objective factors, which complicate this process, exist?

[Answer] Unfortunately, everything is not so simple and smooth. At times, I will say once again the experience of the developments of our institute, when the task of practical introduction at some, albeit even small, enterprise is set, we are immediately faced with the fact that there are simply no such specialized enterprises. It is necessary to establish new enterprises precisely for the introduction of scientific developments. In particular, biotechnological production, especially in the sphere of medicine, is frequently small in scale. It is actually a question of establishing new pilot production plants. Precisely such small enterprises can insure the output of several hundreds of compounds with the continuous change, if this is necessary, of the products list and the methods of production!

Thus, it is necessary to change our traditional notions not only in the sphere of science itself. It is necessary to change our views of the mechanisms and forms of introduction. New approaches, new thinking are necessary.

[Question] But medicine, biotechnology and agriculture cannot wait until this entire fine situation arises. What is one to do today, when the compounds, which have been developed by you, should save the life of people and preserve other forms of organic life?

[Answer] For the present we are trying, as I stated initially, to make our own plans--of the semilaboratory, semi-industrial type, in order to produce

the minimum necessary amount of compounds for medicine, agriculture and so on. We have found understanding in this matter both in the Moscow City Committee of the CPSU and in the Moscow City Soviet and have obtained the opportunity to expand our experimental base by establishing pilot plants for introduction.

[Question] We still have to mention, perhaps, the most important, key question--the question of the personnel who should solve the problems of the acceleration of scientific and technical progress.

[Answer] Quite correct: this is the key question. Today two or three scientific associates, who know the subject well, "weigh" more than two or three laboratories, which are even equipped according to the latest word of science and technology, but do not have such specialists. Unfortunately, there are examples when both laboratory equipment and everything necessary are available, only the necessary scientific leaders and high-class scientists are not available. And such laboratories in science are following the literary sources by the paths which were traversed long ago in world science.

This does not suit academic institutes, this is not their path. We should support priority developments, and the training of the necessary scientists should begin back during the undergraduate years. Such work is being performed at Moscow State University, the Moscow Chemical Technology Institute imeni D. I. Mendeleyev and others. Academic institutes themselves should make a serious turn in this direction. Thus, at our institute a scientific educational center has been set up, many laboratory facilities, which are appropriately equipped and are furnished with the most advanced devices, at which students of Moscow State University and the Physical Technical Institute undergo extensive training in the sphere of the most up-to-date problems of bioorganic chemistry and biotechnology, have been set aside.

It is impossible in one interview to touch upon all the aspects of scientific and technical progress and the role of academic science in its acceleration. I wanted merely to dwell on the most important ones. On those tasks, which the collectives of Moscow institutes should also be working on today.

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